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CATALOGUE  
OF THE  
BRITISH SPECIES OF PISIDIUM  
(RECENT & FOSSIL)  
IN THE  
COLLECTIONS OF THE  
BRITISH MUSEUM  
(NATURAL HISTORY),

WITH  
NOTES ON THOSE OF WESTERN EUROPE.

BY  
B. B. WOODWARD, F.L.S., &c.  
  
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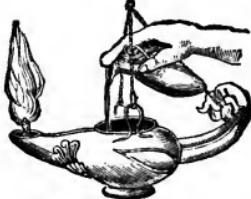
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1913.

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ALERE FLAMMAM.



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## P R E F A C E.

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THE present volume is based on the studies made by the author in his private time during nine winter sessions. It deals with the collections of recent and fossil shells, belonging to the genus *Pisidium*, in the British Museum (Natural History). It is, however, by no means restricted to these, since Mr. B. B. Woodward has had the advantage of making use of a large number of specimens derived from other sources. This is indicated by the unusually long list of helpers whose assistance he acknowledges in his Introduction, and to whom the thanks of the Trustees are also due.

The difficulty of the work has been increased by the small size of the shells described.

The Catalogue is in one respect a departure from the usual practice of the Museum, since it deals with the collections of two Departments, represented respectively by the recent and by the fossil forms.

SIDNEY F. HARMER,  
*Keeper of Zoology.*

British Museum (Natural History),  
London, S.W.  
March 7, 1913.



## TABLE OF CONTENTS.

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	Page
PREFACE . . . . .	iii
INTRODUCTION. . . . .	vii
I. THE GENUS <i>PISIDIUM</i> . . . . .	1
II. HISTORY OF THE BRITISH SPECIES . . . . .	6
III. LIST OF INDETERMINATE PALÆARCTIC FORMS . . . . .	13
IV. DESCRIPTIONS OF THE SPECIES RECOGNIZED . . . . .	16
1. <i>Pisidium annicum</i> (Müller) . . . . .	16
2. " <i>astartoides</i> , Sandb. . . . .	27
3. " <i>casertanum</i> (Poli) . . . . .	31
4. " <i>nitidum</i> , Jenyns . . . . .	44
5. " <i>personatum</i> , Malm . . . . .	53
6. " <i>pusillum</i> (Gmelin) Jenyns . . . . .	60
7. " <i>milium</i> , Held . . . . .	70
8. " <i>pulchellum</i> , Jenyns . . . . .	78
9. " <i>subtruncatum</i> , Malm . . . . .	84
10. " <i>henslowanum</i> (Shepp.) . . . . .	93
11. " <i>spinum</i> , A. Schmidt . . . . .	100
12. " <i>parvulum</i> , Clessin . . . . .	105
13. " <i>steenbuchii</i> (Möller) . . . . .	107
14. " <i>lilljeborgii</i> , Clessin . . . . .	111
15. " <i>hibernicum</i> , Westld. . . . .	116
16. " <i>obtusale</i> (Lam.?) Jenyns . . . . .	119
17. " <i>vincentianum</i> , B. B. Woodw. . . . .	127
V. BIBLIOGRAPHY . . . . .	129
VI. INDEX . . . . .	141
PLATES I-XXX, WITH THEIR EXPLANATIONS.	

---

## TEXT FIGURE.

---

	Page
TOPOGRAPHY OF THE HINGE OF <i>PISIDIUM</i> . . . . .	3



## INTRODUCTION.

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Of all the genera of British non-marine Mollusca none has presented more difficulties to the student than *Pisidium*. The small size of the shells, their great variability, the lack in most cases of any striking external characteristics, as well as the confusion in which the subject has been left by the various authorities, have all contributed to these difficulties, with the result that the genus has been largely neglected.

Very early in our joint work on the post-tertiary Mollusca, Mr. A. S. Kennard and I were led to see that the group must be dealt with, whilst the late Dr. O. Böttger had urged me to study it more closely. It was not, however, till Dr. A. C. Johansen visited this country in 1901 that any serious start was made. Dr. Johansen it was who directed my attention to the hinge-characters as the only sure means of identification of the species, and by his intimate knowledge of the Scandinavian forms he was able to point out that we had species present in Britain hitherto unrecognized.

The investigation of the British species of *Pisidium* was to have been our joint task, but unfortunately for Malacology, Dr. Johansen on his return to Copenhagen was drafted to other zoological work, and this attempt to unravel a very tangled skein was left to me.

Owing to the kind assistance of friends a very large amount of material has passed through my hands. Among others, I am peculiarly indebted to my colleagues at the Natural History Museum, Mr. E. A. Smith, I.S.O., of the Zoological Department, and Dr. Smith Woodward and Mr. Bullen Newton of the Geological Department; to Dr. Kitchin of the Museum of Practical Geology; Dr. Scharff of the National Museum, Ireland; Dr. S. F. Harmer, then in charge of the collections at Cambridge; Mr. James Reeve of the Norwich Castle Museum; and the Curator of the Conchological Society of Great Britain; who all freely allowed me to work over the valuable collections in their charge. Whilst, when early in the work it became necessary to visit Bath in order to see Jenyns' types, Mr. F. Shum, the President, and Mr. E. C. Davey, the Hon. Sec. of the Bath Royal Literary and Scientific Institution, were most kind and assiduous in affording me every assistance in my researches.

Among private collectors, besides Mr. A. S. Kennard and Dr. Johansen, thanks are more especially due and are hereby tendered to :—

Dr. R. Bellini (for Italian specimens, including some from the historic spring at Caserta), the late Dr. O. Böttger, the late Rev. R. Ashington Bullen, C. S. Carter, Major M. Connolly, J. E. Cooper, Capt. W. J. Farrer, Dr. L. Germain of the Muséum d'Histoire Naturelle, Paris (for specimens from the Locard collection), J. W. Jackson, Dr. F. F. Laidlaw, Dr. K. Lampert of the K. Naturaliensammlung in Stuttgart, W. A. Lindholm of Moscow (for specimens from Russia and from Lake Baikal), Mrs. Longstaff, H. Lynge (for Scandinavian specimens), A. Mayfield, J. N. Milne, Il Marchese di Monterosato, C. H. Moore, H. C. Napier, Dr. Nils Hj. Odhner (for Scandinavian specimens), C. Oldham, H. Overton, R. A. Phillips, H. B. Preston, F. W. Reader (for kind and assiduous assistance in the preparation of the photographs that form the basis of the plates), Mons. A. Rutot of the Musée d'Histoire Naturelle, Brussels; A. W. Stelfox, F. H. Sikes, E. R. Sykes, F. Taylor, Dr. J. H. Théel of the Naturhistoriska Riksmuseum, Stockholm, J. R. Le B. Tomlin, the late Major H. Trevelyan (who specially dredged some

of the Irish Lakes), Mons. E. Vincent (for Belgian fossil examples), W. M. Webb, and C. E. Wright. Whilst the Zoological Museum of Copenhagen furnished specimens of *P. steenbuchii* (Möll.).

In the lists of distribution the following abbreviations have been employed for the names of these and other friends and helpers :—

A. M.=A. Mayfield.	F. T.=F. Taylor.
A. S. K.=A. S. Kennard.	H. C. N.=H. C. Napier.
A. W. S.=A. W. Stelfox.	H. O.=H. Overton.
B. B. W.=B. B. Woodward.	H. T.=Major H. Trevelyan.
B.M.=British Museum (Natural History).	J. E. C.=J. E. Cooper.
C. C. S.=Census of the Concho- logical Society of Great Britain.	J. L.=Mrs. J. Longstaff.
C. E. W.=C. E. Wright.	J. N. M.=J. N. Milne.
C. E. Y. K.=Rev. C. E. Y. Kendall.	J. W. J.=J. W. Jackson.
C. H. M.=C. H. Moore.	K. H. J.=Staff-Surg. K. H. Jones, R.N.
C. O.=C. Oldham.	M. P. G.=Museum of Practical Geology.
C. S.=Conchological Society's collection.	N. M.=Norwich Museum.
C. S. C.=C. S. Carter.	R. A. P.=R. A. Phillips.
Camb.=MacAndrew collec- tion, Cambridge.	S. M. C.=Sedgwick Museum, Cambridge.
D. M.=National Museum, Dublin.	T. R.=the late T. Rogers [whose Pisidia are now in the writer's collection].
E. C.=E. Collier.	W. J. F.=Capt. W. J. Farrer.
E. R. S.=E. R. Sykes.	W. M. W.=W. M. Webb.
F. F. L.=Dr. F. F. Laidlaw.	



# CATALOGUE

OF

## SPECIES OF PISIDIUM.

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### I.—THE GENUS *PISIDIUM*.

The genus was established in 1821 by C. Pfeiffer (134), who separated it from *Cyclas* (i. e. *Sphaerium*) on good anatomical grounds, namely, as he puts it, that there is a *single* siphonal tube at the *anterior* end of the shell. He was obviously unprepared to find in this genus the departure from the normal state of the pelecypod shell whereby the posterior portion is the shorter.

Prior to Pfeiffer's time forms now referred to his genus were placed in *Tellina*, by Müller and others following him, in *Sphaerium*, by Scopoli, in *Cardium*, by Poli, and in *Cyclas*, by Draparnaud, Lamarck and his school.

In 1818 Féussac, the elder, in an article on "Cyclade" (61), subdivided the genus *Cyclas* and proposed for one of the sections thus formed the subgeneric name of *Corneocyclas*, which he stated was equivalent to the genus *Cornea* of Megerle (= *Sphaerium*) (112), but among the species he cited, following the practice of Draparnaud, were *Cyclas fontinalis*, Drap., *C. dubia*, Say, and "*C. amnia, tellina amnia*, Müll." *Corneocyclas* does not appear to have been adopted by his contemporaries, nor does De Blainville allude to it in his "Manuel de Malacologie" (1825-27); he merely gives as subdivisions of *Cyclas*:—*Cornea* and *Pisum*, Megerle.

Dr. Dall (49) has recently sought to revive the name *Corneocyclas* for *Pisidium* on the ground that if one removes all the species included in that subgenus by Féussac but now referred to the prior *Sphaerium*, some species remain that ought to retain the name *Corneocyclas*. Seeing, however, that the name was only a subgeneric or sectional one, established openly as a synonym for a prior one (*Cornea*), and that it was never adopted by others, whilst

Dall selects the unknown *Tellina pusilla*, Gmelin, as the type, instead of any of the forms included by Féruccac, one can only regret that, doubtless with the best intentions, the distinguished American Conchologist should have further complicated zoological nomenclature by endeavouring to resuscitate such a mere tentative sectional designation. To set aside Pfeiffer's name, deliberately chosen to designate a group of species having a good common character, in favour of a subgeneric term, that can only be retained for certain of its incidental members by a somewhat arbitrary manipulation, is to stretch the much abused law of priority to its breaking point, and in this Catalogue, therefore, Pfeiffer's name *Pisidium* will be adhered to.

In 1820 Rafinesque (146) used *Phymesoda*\* for one of his divisions of the genus *Cyclas*, his types being "*C. lacustris* (= *Sphaerium*), *C. dubia*, Say, &c." Dall, in spite of its mixed character and faulty definition, revives the name for a section of his *Corneocyclas*, taking however as type, *Tellina virginica*, Gmelin (p. 3236, no. 39), which is held to have priority over Say's *C. dubia*, though what Gmelin's species really was is more than doubtful.

The synonymy of the genus is :—

*Pisidium*, C. Pfeiffer, Naturg. Deutsch., Moll. Abthl. i, 1821, pp. 17 & 123.

*Pisum*, "Megerle, 1811; non Linn.": Gray, Proc. Zool. Soc. Lond. xv, 1847, p. 184.

*Galileia*, O. G. Costa, Fauna Sicilia, Molluschi, p. 1, pl. i, fig. 2 a, A, B (1840).

*Euglesa*,  
*Pera*, } Leach, Syn. Moll. Gt. Brit. 1852, pp. 291-2.  
*Cordula*, }

*Musculium*, Link: H. & A. Adams, Gen. Recent Moll. ii, 1858, p. 451 (non Link).

With regard to *Galileia*, O. G. Costa (sometimes misquoted as "Da Costa"), the usual reference is to Costa's "Correspondenza Zoologica, 1839" (page never given); the name occurs there (p. 181) as applied to a freshwater bivalve, in a review of the author's "Fauna Sicilia," &c., 1840 (46), to which the reader is referred for details. The latter work few appear to have seen; in it the genus and species (*Galileia tenebrosa*) are described and apparently excellent enlarged figures given, which would lead one to suppose the shell was really marine. The Marquess de Monterosato, however, assures me that these figures are quite fallacious, and most kindly forwarded specimens from the type locality, which is inland. These and other specimens which I received from Prof. Bellini proved to be undoubtedly *Pisidium casertanum*, very dwarfed and stunted, accompanied in one of the gatherings by still more stunted *P. personatum*.

\* Misquoted by Prime in his works as "*Physemoda*."

Pfeiffer's diagnosis of the genus *Pisidium* is as follows (134, Abt. i, pp. 17 & 123):—

“**PISIDIUM, Nobis.**

“Thier: statt der röhrenförmigen Tracheen ein schmaler fleischiger Vorstoss an dem *vorderen* Theile der Schalen; der Fuss lang und schmal.

“Gehäus: länglich, ungleichseitig, völlig schliessend; an der rechten Schale ein, an der linken Schale zwei gegeneinander überstehende, sehr kleine Hauptzähne; nach hinten und vorne zwei dünne, lamelleförmige Seitenzähne; letztere an der rechten Schale gespalten, um die gegenüberstehenden aufzunehmen.”

The shell-characters may be more narrowly defined as follows:—

Shell close, ovoid to orbicular, equivalve, inequilateral, posterior side the shorter, more or less concentrically striate, thin, with olive-horny periostracum, sometimes, especially in young individuals and certain species, sparsely covered with short hairs; umbones sometimes prominent, sometimes tumidly obtuse, neponic shell usually smooth; ligament subexternal; hinge formula \*:

$$\begin{array}{c|c|c|c} R.V. \ a.I : a.III & : c.3 : & l & p.III : p.I \\ L.V. : a.II : & c.2 : c.4 & & : p.II : \end{array}$$

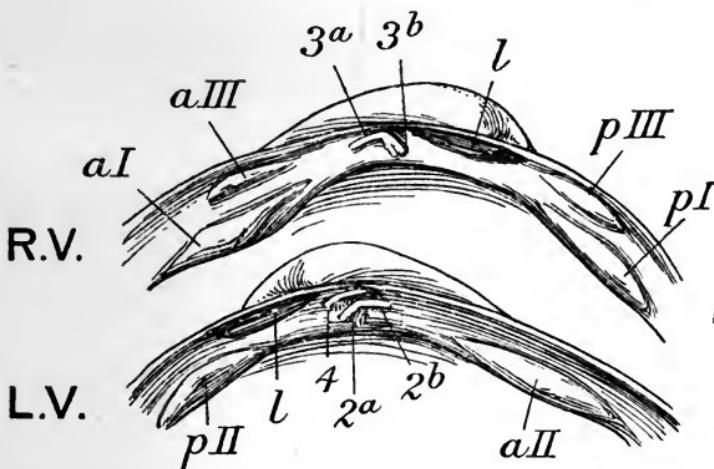


Fig. 1.—Topography of the hinge of *Pisidium*:—R.V. Right valve; L.V. Left valve; *a. I-III*, anterior lateral teeth; *c. 2-4*, cardinal teeth; *l*, ligament; *p. I-III*, posterior lateral teeth.

\* Félix Bernard's nomenclature for the hinge (14) has been followed as being the most scientific. R.V.=Right Valve; L.V.=Left Valve; *a*=anterior lateral teeth; *c*=cardinal teeth; *l*=ligament; and *p*=posterior lateral teeth.

Bernard points out that the hinge in the Eulamellibranchia arises in the form of folds parallel with the shell-margin. With growth, deposits of shelly matter at certain points eventuate in the formation of the teeth of the adult shell. In the group to which *Pisidium* belongs, in the right valve *c. 3* is at first continuous with *a. II*, and in the left valve, *c. 2* with *a. II*, *c. 4* with a subsequently suppressed *a. IV*. In the species of *Pisidium* subsequently described in this Catalogue, it will be noted that all except *P. amnicum* and *P. astartoides* show traces of the former continuity between *c. 2* and *a. II*.

In common with most freshwater mollusca the various species of *Pisidium* are extremely susceptible to the influences of their environment, and thus vary greatly in their external appearance according to their habitat.

If instead of confining one's attention to the study of rows of cabinet specimens from various localities, each too frequently consisting of only some three specimens, the mixed gatherings of species from different places be taken, it speedily becomes evident how great is this effect of environment. In one locality, all the species will exhibit less sculpturing than the normal forms; in another, more; all may be dwarfed, or all abnormally large; occasionally one species in the gathering will show greater increase in size over the average, while its associates are undersized; or exaggerated inflation may be the prevailing feature. Thickening, or attenuation of the shell, or abnormalities, may likewise prove characteristic of certain localities.

As Jeffreys remarks (and similar observations were made by Jenyns and others): "Size, substance, sculpture, and lustre are not of much account, as they mainly depend on the chemical ingredients of the water inhabited by these mollusks, as well as on their supply of food" (81, vol. i, p. 18).

In the course of the present investigations it was found that each species varied in outline from what came to impress itself as the normal form, towards a more rounded shape on the one hand and a more elongate on the other, as well as to assume sometimes a more swollen, sometimes a more flattened condition; whilst the hinges of those taken in quiet waters are feeble and weak, in comparison with the hinges of those habitually dwelling in running water.

Often, while it is comparatively easy to separate the individual species in a given gathering (A, B, and C from locality X, or locality Y), it is a matter of trouble to discriminate between samples of different species from diverse localities (B from locality X may be more like C from locality Y, and so on), if only the external characteristics be depended on. When, moreover, collections from the numerous post-tertiary deposits are examined, the difficulty is enhanced, for then, swept together by the flood-waters in which the deposits were formed, one meets with the mixed rejectamenta of a wide area, where varying environments abounded, whilst the amount of wear and tear the specimens have frequently undergone does not render the task of their identification any the more easy.

The question arises, what then are the best characters to rely on in distinguishing the species. Jeffreys (81, vol. i, p. 18) recognized that little reliance could be placed on the soft parts—or at all events on their external features. Nor would these avail in the present investigations in which it is sought to deal equally with fossil forms. The external form of the shell, on which Jeffreys somewhat reluctantly depended, we have seen to be unreliable. Fortunately the Pelecypod shell far more closely

reflects the animal than does the Gastropod, and the muscle-scars in some cases, though not, seemingly, in *Pisidium*, and especially the hinge furnish reliable data.

Bourguignat was, we believe, the first to insist on the utility of the hinge for broadly classifying the species of *Pisidium* (21, p. 82), but unfortunately he did not realise the applicability of its detailed characteristics for the purpose of the determination of species.

Jeffreys, who was acquainted with Bourguignat's paper, overlooked, or did not give sufficient heed to, the pregnant suggestion, and it was Clessin (35) who first, in theory at all events, made use of the detailed hinge-characters for the determination of species.

Under the circumstances, when entering upon the researches of which the results are set forth in the following pages, it seemed advisable to ignore in the first instance all names whatsoever, to ascertain simply how many distinct forms of the genus could be differentiated, taking the details of the hinge-structure as a guide, and to leave the question of their final nomenclature till the last.

Many thousands of specimens, recent and fossil<sup>1</sup>, were studied; many hundreds of the recent forms had to be opened by boiling in a test-tube in weak caustic soda, before they could be examined under the microscope (1-in. objective), and a very large number of the fossil forms had to be scrutinized three or four times, individually, under a lens.

In the end seventeen well-marked forms were discriminated, of which two are extinct, whilst one has not as yet been found, either recent or fossil, in these Isles, although it possibly does occur, thus leaving fourteen species known to be living in Britain.

To attempt subdivision of the genus and allot sectional names on so few forms is to court disaster more complete than has overtaken others with more extensive material to hand.

Clessin (35) divided the genus into three groups:—

1. FLUMININA, type: *P. amnicum*, Müll.
2. RIVULINA, type: *P. supinum*, Schmidt.
3. FOSSARINA, type: *P. obtusale*, C. Pfr.

His first group, as Sterki (166) has already shown, was based on a misapprehension of the cardinal tooth of the right valve of *P. amnicum*, which he thought was double; whilst his other groups prove to be incongruous mixtures.

Westerlund (184) followed Clessin, but added a totally unnecessary fourth group for the "deep-water" forms.

Dall's grouping (49) unhappily does not give promise of any greater permanence, and one can only hope that Dr. Sterki, who is working at the American species, may, with the plentiful examples at his command, be able to attain better results.

The seventeen forms in question in this paper are capable, however, of being roughly classed. Thus *P. amnicum* and

*P. astartoides* stand by themselves distinct from the rest. *P. casertanum*, *P. nitidum*, *P. personatum*, and *P. pusillum*, with probably *P. milium*, form a group of transitional forms, that is linked on the one hand through *P. pulchellum* with *P. subtruncatum*, *P. henslowanum*, *P. supinum*, and *P. parvulum*; and on the other hand, through *P. steenbuchii* with *P. lilljeborgii*, *P. hibernicum*, and *P. obtusale*. *P. vincentianum*, with its depressed ligament-pit, is a form apart.

## II.—HISTORY OF THE BRITISH SPECIES.

The history of the establishment of the several species here recognized and the varying forms admitted by successive conchologists of note is briefly as follows:—

1774. O. F. Müller described (123), but did not figure, nor cite any figure, his *Tellina amnicum*. Concerning the identity of this species there fortunately is no doubt, although a large synonymy now follows the name.
  1791. Gmelin described (97) a form under the name of *Tellina pusilla*, referring to a figure by Schröter. The description is inadequate for modern purposes: the figure conveys the impression of a strongly striate form, such as *P. pulchellum* or a young *P. amnicum*, and the outline rather favours the latter. The name was used by Turton, Brown and others for any or all of the smaller species of the genus, and since it is impossible to say what Gmelin's shell was, the use of the name must date from Jenyns, who first circumscribed the species, as we know it.
  1795. Poli described (138) and figured *Cardium casertanum*. Neither figure nor description would enable one to identify the species with certainty, but specimens sent me by Prof. Bellini from the type locality, where it appears to be the only species present, confirm the traditional belief on the Continent that it is the same as Alder's *P. cinereum*.
  1801. Draparnaud (51) created *Cyclas fontinalis* for certain forms obviously belonging to *Pisidium*. His description is, however, too meagre, and his figures, published in 1805 (52, pl. x.), too rough to enable one to say exactly what they were; whilst, unfortunately, his specimens have been lost. If a guess might be hazarded from the representations, it would be that the type and var.  $\gamma$  were *P. casertanum*, and the var.  $\beta$  one of the smaller species. The name has been largely used on the Continent for forms identical with that taken in these pages as *P. casertanum* (Poli). It would therefore seem advisable to drop the name altogether.
- Draparnaud's only other species referable to *Pisidium* was his *C. palustris*, a synonym for *P. amnicum*.
1818. Lamarck (92) separated out a small tumid form to which he gave the name *Cyclas obtusalis*. The description was

not adequate, still it sufficiently fits the form to which Jenyns subsequently applied it.

Lamarck's other two species referable to *Pisidium* are:—  
*Cyclas obliqua* (= *Pisidium amnicum*) and *Cyclas fontinalis*.

1821. C. Pfeiffer (134) defined the genus *Pisidium* and placed in it:—1. *P. obliquum* (Lam.), 2. *P. obtusale* (Lam.), and 3. *P. fontinale* (Drap.). It is doubtful if the latter were the same as Draparnaud's species, and the descriptions and figures are equally vague.
1825. Sheppard (163) discovered and named *Tellina henslowana*. His characterization leaves no doubt as to his species, which is never questioned.
1832. Jenyns published his classical memoir (83) from which dates our present knowledge of the British Pisidia. He detected two additional species, and had he only been aware of the value of the hinge-characters, would certainly have added more, for some of his species undoubtedly combined more than one form. His descriptions are full, but the figures, though beautifully drawn, are not accurate representations from the scientific point of view, as a careful comparison of them with original specimens at Bath showed. His species were:—

1. *P. obtusale*, Pfeiffer.

2. *P. pusillum*, nobis.\*      (The extreme variety fig. 5 would probably, could it be opened, prove to be *P. personatum*.)

3. *P. nitidum*, nobis.

4. *P. pulchellum*, nobis.  
    "                  var.  $\beta$  }      (These proved to be worn examples of the oval form of *P. subtruncatum*, Malm.)  
    "                  var.  $\gamma$  }

    "                  var.  $\delta$ .      (This, as well known, proved to be *P. milium*, Held.)

5. *P. henslowianum*, nobis.\*

    "                  var.  $\beta$ .      (This was a perfect specimen of *P. subtruncatum*.)

6. *P. amnicum*, nobis.\*

Jenyns, when he wrote his paper, was not acquainted with the form here designated *P. casertanum*, but his collection contains specimens of *P. cinereum*, Alder, sent him by that naturalist, as well as *P. gibba* (seemingly an oval form of *P. nitidum*) and *P. fontinale* (= *subtruncatum*), both from Alder, who in 1838 put them in Jenyns' *pusillum*.

\* Jenyns adopted the current botanical method of nomenclature in which the name of the author of the complete name, and not of the species only, is given. The authors of the species appear in the synonymy.

1836. Held, in his paper on Bavarian Mollusca (77), enumerated Pfeiffer's species and added *P. milium*. His description of this last is far too scanty for recognition, but Clessin saw the original specimen and depicted it in his Monograph, and since the figure in that work is unmistakable, the name is gladly accepted on his authority.
1840. Gray brought out an edition of Turton's "Manual" (176) in which he accepted Jenyns' species and added *P. cinereum*, Alder. Of *P. pulchellum* he remarked that Jenyns was inclined to believe that his var.  $\beta$  and  $\delta$  were "a distinct species for which he would retain the name *pulchellum*, while I would propose the name of *P. jenynsii* for the other varieties" (p. 285). That is to say, if the specimens under discussion were really the type examples in Jenyns' collection, one of the worn specimens of *P. subtruncatum* and the *P. milium* were to become the types of *P. pulchellum*, whilst the original type and the other worn example of *P. subtruncatum* were to constitute *P. jenynsii*. This forcible exchange of type is not recognized now-a-days, and in the absence of specimens to show what Gray had before him, or that this readjustment was anything more than one on paper, Gray's name must lapse.

Probably the latter alternative was the case, for in 1858 (84, p. 105) Jenyns states that Gray proposed the name *P. jenynsii* for the first of the three varieties of *P. pulchellum* (he had evidently forgotten that by inference var.  $\gamma$  was included), and adds "but I do not believe now that this variety is . . . . distinct from the var.  $\beta$  of my monograph . . . . The variety which Dr. Gray has termed *jenynsii* differs from the more ordinary form of *pulchellum* by the striae being more deeply cut, and the shell being broader in proportion to its length."

1842. Möller published the description (115) of his *Cyclas steenbuchii* from Greenland.
1843. Macgillivray in his account of the Mollusea of Scotland (104) enumerates:—

- |   |   |
|---|---|
| 1. <i>P. joannis</i> (n. sp.).<br>2. <i>P. jenynsii</i> .<br>3. <i>P. pulchellum</i> (var. $\beta$ , Jenyns). | 4. <i>P. nitidum</i> .<br>5. <i>P. pusillum</i> .<br>6. <i>P. amnicum</i> . |
|---|---|

Jenyns, whom he consulted, remarked of the first species:—"This I believe to be the *P. pulchellum*, var.  $\alpha$  of my monograph . . . . which Gray . . . . proposes should be named *P. jenynsii*; but they are much larger than any specimens in my possession before . . . . If it is not what I suppose it to be, it is new." (104, p. 249.) Macgillivray treated it as such, but unfortunately his specimens have been lost, and since the species cannot be identified with certainty the name will have to be

dropped. His description suggests one of the forms of *P. pusillum*. Jenyns assented to the determination of the second species, but Macgillivray says "*P. jenynsii* and *P. pulchellum* . . . and all their varieties, I am almost persuaded, are of one single species" (p. 251).

Macgillivray's third species, if it was identical with Jenyns' specimen, would be *P. subtruncatum*.

1849. Forbes and Hanley published their classical work (63), and, when treating of *Pisidium*, followed Jenyns, adding, of course, *P. cinereum*, Alder. They cite Jenyns as having reverted to the integrity of his *P. pulchellum*, but at the same time shrewdly suggest that his var.  $\delta$  "appears the least connected with the rest." (Vol. ii, p. 129.)
1850. Schmidt (156) defined *P. supinum*, but it was some years before his species was recognized.
1852. The section of Dupuy's celebrated "Histoire" (55) was published containing the chapters on *Pisidium*. He distinguished 12 species, five of which have passed into synonymy, the only item now of interest being that he ranked Jenyns' *P. pusillum* as a synonym of his *P. fontinale*.
1855. Malm (106), dealing with the Swedish non-marine Mollusca, enumerated nine species, of which two, *P. subtruncatum* and *P. personatum*, were new and of great importance, inasmuch as it was failure to recognize these two forms that led to much of the confusion into which the work of British and other authors had been thrown. One of Malm's species, which he believed to be new, *P. arcaeforme*, is identical with *P. milium*.
1854. Bourguignat published a note on Pisidia (21), in which he laid down the utility of the hinge as a basis for classification. His species were those of Jenyns, with the addition of *P. casertanum* (which, however, was made to include *pulchellum* and the forms now referred to *milium*) and a new species *P. reclusianum*, which Jeffreys considered (80, p. 39) to be founded "on young specimens of *P. henslowianum* (var. *pulchellum*)," but which rather suggest fry of *P. amnicum*.
1855. Gassies, in his description of the Pisidia of Aquitaine (65), raised the number of species to fourteen. Four of these he supposed to be new, but they have passed into synonymy.
1856. Moquin-Tandon in his well-known "Histoire" (116) acknowledged only six species:—

- |                            |                         |
|----------------------------|-------------------------|
| 1. <i>P. henslowanum</i> . | 4. <i>P. nitidum</i> .  |
| 2. <i>P. amnicum</i> .     | 5. <i>P. pusillum</i> . |
| 3. <i>P. casertanum</i> .  | 6. <i>P. obtusale</i> . |

He included Jenyns' *P. pulchellum*, and consequently *P. milium*, under *P. casertanum*.

1857. Baudon, the French Jenyns, in his careful "Essai" (9) made partial use of the hinge for classification, but did not avail himself of its details for the distinction of species, of which he specified eight :—

- |   |   |
|---|---|
| 1. <i>P. obtusale.</i>                        | 5. <i>P. casertanum.</i>                  |
| 2. <i>P. pusillum.</i>                        | 6. <i>P. amnicum.</i>                     |
| 3. <i>P. nitidum.</i>                         | 7. <i>P. henslowanum.</i>                 |
| 4. <i>P. gassiesianum</i> [= <i>milium</i> ]. | 8. <i>P. conicum</i> [= <i>supinum</i> ]. |

He included the whole of Jenyns' *P. pulchellum* under *P. casertanum*. Unfortunately Malm's work was not known to him.

1858. Jenyns published some notes on the smaller species (84) in which he modified certain of the conclusions he had come to in his Monograph. He had received five specimens agreeing exactly with his *P. henslowianum* except in being entirely destitute of the lamelliform projection on the umbones, and was at first doubtful whether to refer them to *P. henslowianum* or *P. pulchellum*. It has been pointed out that in the case of both these species Jenyns had included specimens of *P. subtruncatum* to which obviously the new finds belonged, and since he never made any distinction, as is done to-day, between the type and varieties of a species, he came to the conclusion that his *P. henslowianum* and *P. pulchellum* should form one species, and since the former was the older name it should "in future be adopted as the general name for this species." He further considered the normal form of *P. henslowianum* thus constituted would be that without the appendiculae (p. 105), and added (p. 106) that "if it be thought desirable still to retain a name for that variety which is so peculiarly distinguished by the umbonal appendages it might be called var. *appendiculata*."

This forcible dethronement of Sheppard's type, in which the appendiculae formed its salient character, cannot of course be entertained.

Jenyns also remarked in this paper (p. 106) "I am inclined to think that the *P. pusillum* and *P. cinereum* are not distinct."

He further cautioned collectors against deciding hastily on any of these small bivalves, adding (p. 107): "This remark applies especially to the *P. nitidum*, which in general form is so similar to the *P. pusillum*."

1859. Early the following year Jeffreys, in his "Further Gleanings" (80), published for the first time his conclusions as to the species of *Pisidium*.\* These he reduced to five in number, viz.:—

\* He had already communicated them in the previous November to Jenyns, as shown by extracts kindly made for me from the Jenyns Correspondence at Bath by Major M. Connolly.

- |  |  |
|--|--|
| 1. <i>P. pusillum</i> (including<br><i>obtusale</i> ). | 4. <i>P. henslowianum</i> (including<br><i>pulchellum</i> and <i>cinereum</i> ). |
| 2. <i>P. nitidum</i> .                                 | 5. <i>P. amnicum</i> .   |
| 3. <i>P. roseum</i> .                                  |  |

When it is considered that examples of *P. subtruncatum* were intermixed with Jenyns' *P. henslowianum* and *P. pulchellum*, and that fine specimens of *P. subtruncatum* do bear some external resemblance to *P. cinereum*, Jeffreys' No. 4 is not so incomprehensible; but what is to be said of his association of two such distinct forms as *P. pusillum* and *P. obtusale*?

One feasible explanation appears to be that Jeffreys unconsciously transposed Jenyns' *P. obtusale* and *P. nitidum*, just as on the two occasions in which in his "British Conchology" (vol. i, pp. 32 & 38) he described the teeth of *Unio*, he in each case transposed the two valves and described right for left and *vice versa*.

This hypothesis receives support from the discovery in the T. Rogers collection of Pisidia (now in the writer's possession) of two tubes marked "*Pisidium nitidum* from J. G. Jeffreys" and "*Pisidium nitidum*, var. *globosa*, J. G. Jeffr. (new)" (Pl. XXX, f. 5), both containing specimens indistinguishable from Jenyns' type specimen of *P. obtusale* at Bath. Furthermore, in "British Conchology" *P. nitidum* is classed by itself under the section "C. Round," which is exactly what Jenyns' *P. obtusale* is and his *P. nitidum* is not. At the same time the confusion, if such it be, is made worse by his retention of the descriptions of some of the characteristic features as given by Jenyns under the latter's names. On the other hand, ovate forms of *P. nitidum* are externally very like some forms of *P. pusillum*, as Jenyns especially pointed out in his notes to which allusion has just been made, while there is little doubt, though it was not possible to prove the fact by opening them, undetected specimens of *P. personatum* were intermixed with both.\*

Jeffreys, however, did recognize the distinctness of Jenyns' *P. pulchellum*, var.  $\delta$  and its identity with *P. gassiesianum* of Dupuy, but was less happy in attributing it to *P. roseum*, Scholtz (Pl. XIII, f. 9; XV, f. 11), solely on the supposed identity of the colour of the animals, when he had never seen Scholtz' specimens; still, since the name of *P. milium*, Held, has the prior claim, no more need be said. One other fact of importance should be noted, namely, that at this period, Jeffreys spoke of "*P. fontinale* of Pfeiffer (our *P. pusillum*)" (p. 38), and in Rogers' collection there

\* Of two series of specimens in the Norman collection at the British Museum, marked "*Pisidium nitidum*. Examined by Jeffreys," one [1911.10.26: 7775-93] was *P. personatum* and the other [1911.10.26: 7826-45] *P. pusillum*, immature and rather rounder than usual.

was a tube marked “*Pisidium pusillum* large variety J. G. Jeff.” (Pl. XIII, f. 2; XV, f. 12) containing typical *P. casertanum*.\*

1862. When the first volume of Jeffreys’ “British Conchology” appeared he still recognized five species of *Pisidium*, but the collocation of the forms was not quite the same. The new arrangement was as follows:—

A. Triangular.	{ 1. <i>P. amnicum</i> .
	2. <i>P. fontinale</i> .
B. Oval.	3. <i>P. pusillum</i> .
C. Round.	4. <i>P. nitidum</i> .
D. Oblong.	5. <i>P. roseum</i> .

The change was that Jeffreys no longer considered *P. fontinale* to be a variety of *P. pusillum*, but reckoned it a distinct species, putting under it as varieties *P. henslowianum*, *P. pulchellum*, and *P. cinereum*.

With the substitution of the name *P. milium* for *P. roseum* this arrangement has persisted down to quite recent times in the history of British Conchology.

1863. Reeve, whose work (147) has not altogether received the attention it merits, raised the number of species to seven by according specific rank to *P. obtusale*, *P. pulchellum*, and *P. henslowianum*, whilst leaving *P. milium*, as represented by some of its many names, under the synonymy of *P. pulchellum*.
1864. E. von Martens (108) described, under the name of *P. antiquum*, a form from the Pleistocene of Siberia, that was subsequently redescribed in 1880 by Sandberger from the Cromerian of West Runton as *P. astartoides*. This form had long been reckoned merely a variety of *P. amnicum*. Von Martens’ name being preoccupied, Sandberger’s stands for the species.

- 1874-77. Clessin wrote that portion of his Monograph on the Cycladea (35) which deals with *Pisidium*.

He advocated the employment of the hinge-characters in the discrimination of the species, of which he admitted far more than British authors would, although by no means so lavish of them as some continental writers. He was badly served by his printer, for the work abounds in typographical errors, and by his artist, for, with the exception of *P. milium*, the coloured figures are distorted travesties and the diagrams of the hinge-teeth incorrect.

1886. Clessin (59) named *P. lilljeborgii*, a form recently met with in Ireland.
1894. Westerlund (185) added an Irish species, *P. hibernicum*, to the British List.

\* Jenyns, as already noted (ante, p. 10), was inclined to refer Alder’s *P. cinereum* to his own *P. pusillum*.

## III.—LIST OF INDETERMINATE PALÆARCTIC FORMS.

The following named species have not been dealt with in this paper or relegated to synonymy, either because of the inadequate descriptions given of them and the absence of the actual or authenticated specimens on which to form an opinion concerning them, or for other specified reasons :—

*Pisidium acutum*, m.: L. Pfeiffer, Arch. f. Naturg. vii, 1841, Bd. i, p. 230.

Forbes and Hanley (63, vol. ii, p. 131) refer this to *P. henslowanum*, and other writers have copied from them, but it is hard to see the reason, especially when the author notes that it seems more nearly allied to *P. obliquum* [= *annicum*] than to *P. fontinale*.

*Pisidium asperi*, Cless.: Clessin in Suter, Malakoz. Blätt., N. F. xi, 1889, p. 26. Zugersee, 200 m. Not afterwards referred to.

— : *P. milium*, var. *asperi*, Cless.: Clessin in Suter, Malakoz. Blätt., N. F. xi, 1889, p. 25; Clessin, Moll.-Fauna Oesterreich-Ungarns, 1890, p. 786, fig. Klönsee, 27 m.

Whether the author considered this and the preceding species to be identical or not does not appear.

*Pisidium barbozanum*, Castro in coll.: Locard, Arch. Mus. Hist. Nat. Lyon, vii, no. 1, p. 210.

This may be a dwarfed *P. casertanum*, or *P. nitidum*.

*Pisidium canariense*, Shuttl.: Shuttleworth, Mitthl. Naturf. Gesell. Bern, 1852, p. 146.

*Pisidium charpentieri*, m.: Clessin, Moll.-Fauna Oesterreich-Ungarns, 1890, p. 787, fig.

*Pisidium colbeani*, Clessin: Clessin in Küster, Syst. Conch.-Cab. ix, Abth. 3, Cycladeen, p. 48, 1874, pl. v, f. 21–23.

*Pisidium conventus*, n. sp.; Clessin, Malakoz. Blätt. 1877, p. 181.  
May be *P. nitidum*.

*Pisidium creplini*, Dkr.: Deshayes, Cat. Conch. Brit. Mus. ii, p. 280.  
Is a *Sphaerium*.

*Pisidium dabneyi*, nov. sp.: Guerne, Le Nat. ix, 1887, Sér. II, p. 195.  
Is probably a *Sphaerium*.

*Pisidium ddingoli*, Bivona: Villa, Disp. Syst. Conch. 1841, p. 44.  
Is a *Sphaerium*.

*Pisidium demissum*, m.: Clessin, Correspond.-Bl. zool.-min. Ver. Regensburg, xxviii, 1874, p. 182.

*Pisidium dubrueili*, nob.: Baudon, Rev. Sci. Nat. i, 1872, p. 20, pl. iii, f. 1–4.

*Pisidium duplicatum*, m.: L. Pfeiffer, Arch. f. Naturg. vii, 1841, Bd. i, p. 230.

Mörel (119, p. 336) and Kreglinger (91, p. 362) make this a synonym for *P. nitidum*. It was overlooked by Forbes and Hanley, although its description follows that of *P. acutum*. Pfeiffer says that the species seems to be related to the *Cyclas appendiculata*, Turt., with which he was unacquainted.

*Cyclas fontinalis*: Draparnaud, Tabl. Moll. France, 1801, p. 105.  
Probably in part *P. casertanum* (see pp. 6 & 33).

*Pisidium foreli*, m.: Clessin, Correspond.-Bl. zool.-min. Ver. Regensburg, xxviii, 1874, p. 181.

May be either *P. nitidum* or *P. personatum*.

*Pisidium fragillum*, Clessin: Clessin, Moll.-Fauna Oesterreich-Ungarns, 1890, p. 780, fig.

*Pisidium fuscum*, Parr.: Parrys, Haidinger Berichte, vi, 1850, p. 101 [n. n.]

*Pisidium futtereri*, n. sp.: Clessin in Futterer, Durch Asien, iii, 1903, p. 82.

*Pisidium imbutum*, Clessin: Clessin, Moll.-Fauna Oesterreich-Ungarns, 1890, p. 784, fig.

*Pisidium imhofi*, m.: id., op. cit. p. 790, fig.

*Pisidium jenynsii*: Gray in Turton, Manual Shells Brit. Is., new ed., 1840, p. 285. (See ante, p. 8.)

*Pisidium joannis*: Macgillivray, Hist. Moll. Anim. Aberdeen, etc., 1843, pp. 209 & 248. (See ante, p. 8.)

*Pisidium kükenurense*, n. sp.: Clessin in Futterer, Durch Asien, iii, 1903, p. 82.

*Pisidium lateumbonatum*, n. sp.: id., loc. cit.

*Pisidium luganense* [n. sp.]: Clessin, Moll.-Fauna Oesterreich-Ungarns, 1890, p. 789, fig.

*Pisidium lumstenianum*, n. sp.: Forbes, Ann. & Mag. Nat. Hist. ii, 1838, p. 255.

Proved when opened to be *Lasaea rubra*.

*Pisidium miliolum*, n. sp.: Clessin, Nachrichtsbl. Deutsch. Malakoz. Gesell. xxxix, 1907, p. 8.

*Cyclas minima*, mihi: Studer, Naturw. Anzeig. Allg. Schweiz. Gesell. gesammt. Naturw. iii, 1820, p. 93.

Kreglinger (91, p. 364) makes this a synonym for *P. obtusale*.

*Pisidium minimum*, nobis: Malzine, Mém. Soc. Sci. Hainault, Sér. III, i, 1867, p. 298.

Probably fry: indeterminate.

*Pisidium moussonianum*, m.: Clessin, Moll.-Fauna Oesterreich-Ungarns, 1890, p. 787, fig.

*Pisidium obliquatum*, n. sp.; Clessin in Futterer, Durch Asien, iii, 1903, p. 82.

*Pisidium obtusatum*, Clessin: Clessin in Küster, Syst. Conch.-Cab. ix, Abth. 3, Cycladeen, p. 41, 1875, pl. iv, f. 19-21.

*Pisidium occupatum*, n. sp.: Clessin, Bull. Soc. Vaud. Sci. Nat., Sér. II, xiv, p. 237, pl. iii, f. 4.

May be *P. nitidum*.

*Pisidium olivetorum* [n. sp.]: Bérénégier, Essai Faune Malac. Var., 1883, p. 91. [Fide Locard, Coq. Eaux douces France, 1893, p. 143.]

*Pisidium ovale*, n. sp.: Clessin in Futterer, Durch Asien, iii, 1903, p. 82.

*Pisidium piattii*, nov. sp.: Adami, Bull. Soc. Malac. Ital. xi, 1885, p. 231, f. 15.

*Pisidium profundum*, n. sp.; Clessin, Bull. Soc. Vaud. Sci. Nat., Sér. II, xiv, p. 239, pl. iii, f. 5.

May be either *P. nitidum* or *P. personatum*.

*Pisidium prolongatum*, n. sp.: Clessin, Malakoz. Blätter 1877, p. 180, pl. iii, f. 6.

Said to be near *P. occupatum*. May be *P. nitidum* or *P. subtruncatum*.

*Pisidium prolongatum*, Clessin: Clessin in Suter, Zool. Anz. iii, 1880, p. 208 [n. n.]; Clessin, Moll.-Fauna Oesterreich-Ungarns, 1890, p. 785, fig.

An obviously different species to the preceding.

*Pisidium quadrangulum*, Clessin: Clessin, Moll.-Fauna Oesterreich-Ungarns, 1890, p. 781, fig.

*Pisidium rambottianum*, nov. sp.: Adami, Bull. Soc. Malac. Ital. vii, 1881, p. 200.

The author says it has some affinity with "subtruncatum, Jen."!

*Pisidium reclusianum*, nobis: Bourguignat, Journ. de Conch. iii, 1852, p. 174, pl. viii, f. 8 a-d.

Jeffreys (Ann. & Mag. Nat. Hist., Ser. III, iii, 1859, p. 39) refers this to "young specimens of *P. henslowianum* (var. *pulchellum*)," but it is too flat and not round enough. More probably it is fry of *P. amnicum*.

*Pisidium reclusianum*, Bourg.: Baudon, Mém. Soc. Acad. Oise, Beauvais, iii, 1857, p. 53 [non Bourg.].

Jeffreys (Ann. & Mag. Nat. Hist., Ser. III, iii, 1859, p. 38) determined this to be *Turtonia minuta*, to which Baudon assented (Journ. de Conchyl. viii, 1860, p. 179).

*Pisidium rotundum*, P. de Cess.: Cessac, Bull. Soc. Sci. Nat. Creuse, ii, 1855, pp. 73-77.

An abnormality.

*Pisidium schmidti*, n. sp.: Clessin, Nachrichtenbl. Deutsch. Malakoz. Gesell. xxxix, 1907, p. 8.

*Pisidium sinuatum*, Bourg.: Bourguignat in Petit de La Saussaye, Journ. de Conch. ii, 1851, p. 421 note; id., op. cit. iii, 1852, p. 49, pl. i, f. 6-10. [Figure suggests fractured *P. amnicum*.]

Baudon (Journ. de Conch. iv, 1853, pp. 277-279) refers it to *P. casertanum*.

*Pisidium studeri*, Clessin: Clessin, Moll.-Fauna Oesterreich-Ungarns, 1890, p. 782, fig.

*Pisidium submersum*, n. sp.: Clessin, Malakoz. Blätter 1877, p. 179, pl. iii, f. 6.

May be *P. subtruncatum*.

*Pisidium tritonis*, Clessin: Clessin, Moll.-Fauna Oesterreich-Ungarns, 1890, p. 783, fig.

*Pisidium urinator*, n. sp.: Clessin, Bull. Soc. Vaud. Sci. Nat., Sér. II, xiv, p. 236, pl. iii, f. 3.

May be *P. pusillum*.

*Pisidium watsoni*, Paiva: Baron de Paiva, Journ. de Conchyl. xiv, 1866, p. 340, pl. xi, f. 3.

Probably *P. casertanum*.

## IV.—DESCRIPTIONS OF THE SPECIES RECOGNIZED.

1. **Pisidium amnicum** (Müller).

[Pls. I, f. 1; III, f. 1; V-IX.]

1774. *Tellina amnica*: Müller, Verm. Hist. ii, p. 205.  
 1797. *Tellina rivalis*: Maton, Trans. Linn. Soc. iii, p. 44, pl. xiii, f. 37, 38.  
 1801. *Cyclas palustris*: Draparnaud, Tabl. Moll. p. 106.  
 1803. *Cardium amnicum*, Müll.: Montagu, Test. Brit. p. 86.  
 1813? *Cyclas amnica*, Müll.: Fleming, Edinb. Encyclop. vii, p. 92.  
 1818. *Cyclas obliqua* [n. sp.]: Lamarck, Anim. sans Vert. v, p. 559.  
 1821. *Pisidium obliquum*, Lam.: C. Pfeiffer, Naturg. Deutsch. Moll. i, p. 124, pl. v, f. 19, 20.  
 1832. *Pisidium amnicum*, Müll.: Jenyns, Trans. Camb. Phil. Soc. iv, p. 309, pl. xix, f. 2.  
 1838. *Pisidium inflatum*: Megerle in Porro, Malac. Comasca, p. 121, pl. ii, f. 13: cites:—"Syn. *Cyclas pfeifferi*, Zeigler (sec. Stenz.)."  
 1849. *Pisidium amnicum*, Jenyns: Gassies, Tabl. Moll. Agenais, p. 208.  
 1852. *Pera henslowiana*: Leach, Moll. Brit. Synop. p. 291.  
 — *Pera amnica* { id., op. cit. p. 292.  
 — *Pera fluviatilis* { id., op. cit. p. 293.  
 — *Cordula amnica*: id., op. cit. p. 293.  
 1854. *Pisum amnicum*, Müll.: Deshayes, Cat. Conch. Brit. Mus. ii, p. 274.  
 1855. *Pisidium intermedium*, nob.: Gassies, Actes Soc. Linn. Bordeaux, xx, p. 338, pl. i, f. 4. (Cf. id., Journ. de Conch. v, 1856, p. 143.)  
 1858. *Musculium amnicum*, Müll.: Adams, Gen. Rec. Moll. ii, p. 451. (*Pisum amnicum*, id., op. cit. p. 460.)  
 1879? *Pisidium alienum*, n. sp.: Clessin in Küster, Syst. Conch.-Cab. ix, Abth. 3, Cycladeen, p. 269, pl. xli, f. 3-5.  
 1880. *Pisidium amnicum*, var. *nova* [n. v.]: Paulucci, Bull. Soc. Malac. Ital. vi, p. 176.  
 1887. *Pisidium elongatum* (olim *amnicum*, var. *elongata*, Baud.): Servain, Bull. Soc. Malac. France, iv, p. 252.  
 1888. *Pisidium danubiale* (Bourg. in coll.): Servain, Bull. Soc. Malac. France, v, p. 313.  
 1893. *Pisidium depressum* { n. spp.: Locard, Coquil. Eaux douces  
 — *Pisidium transversum* { France, p. 140.  
 1902. *Pisidium baicalense*, n. sp.: Dybowski, Nachrichtsbl. Deutsch. Malakoz. Gesell. xxxiv, p. 93; Rossmässler, Icon., N. F. x, f. 1814.  
 1903. *Corneocyclas* (*Pisidium*) *amnica*, Müll.: Dall, Proc. Biol. Soc. Washington, xvi, p. 7.  
 1909. *Pisidium subtilestriatum*, n. sp. [=var. *nova*, Paul.]: Lindholm in Korotneff, Wissensch. Ergebn. Zool. Exped. Baikal-See, iv, p. 84, pl. ii.

Fortunately there is no doubt about the identity of this species, which was first described as British by Dr. Maton in 1797.

Müller's original description (123, ii, p. 205) is as follows :—

“ *Tellina testa subcordiformi, transversim sulcata, umbone obtuso . . . diam. 1–5 lin.* ”

*Testa minus globosa, umbonesque minus gibbi, quam in *T. rivali* [= *Sphaer. cornuum*], quam maxime refert; alba, fusca & lutea variat; costa nigricans similiter in hac, in quibusdam duplex, simplex vel nulla; lineis transversim elevatis quasi imbricata, intus glabra, subcaerulea.*

*Cardinis denticuli sex vel octo cum fossulis excipientibus, in altera nempe valvula utrinque dens solitarius, ac medio cardine denticuli duo, approximati; in altera utrinque denti- culi duo. Testæ juniorum candidæ, pellucidæ.”*

To this it may be well to add Jenyns' fuller description (83, p. 310) of the exterior of the shell, that stands in need of no further amplification so far as regards British forms :—

“ *Testa paulò variabilis, ovalis, vel obliquè trigona, distinctè inæquilateralis, ventricosa, anticè planiuscula, pulchrè striata hic et illic sulcis profundioribus; cinerascenti-fusca, maculis et zonâ marginali latâ pallidioribus, interdùm nitidè lutes- centibus; rariùs omnino fuscescens aut lutescens; intus cærulescens: umbones obtusi, sorde ferrugineâ . . . sèpe incrustati.* ”

On the other hand, a more detailed diagnosis of the hinge is necessary :—

*Hinge* (Pl. I, f. 1; III, f. 1) a little more than  $\frac{3}{4}$  the length of the shell, wide, solid, and projecting well inwards; moderately curved.

- R.V. *a. i.* a little more than  $\frac{1}{3}$  the length of the hinge-line, stout, curving inwards; *base* strong and swollen; *apex* on distal side of centre, prominent, bluntly obtuse; *ridges* rounded, distal sloping at first steeply, then very gradually, umbonal descending fairly steeply to a lower level than the distal.
- a. III.* about  $\frac{1}{2}$  the length of *a. i.*, from which it is separated by a deep fossa, somewhat apposed to the shell-margin; base becoming confluent with that of *a. i.* towards the umbo; *apex* on distal side of centre, moderately prominent; ridges fairly sharp-edged and steep.
- b.* prominent, sharply flexed and deeply notched under the umbo. *a* lamelliform, sharp, higher towards the middle, running diagonally forward from the umbo, at a high angle, half across the hinge-plate. *b* spreading out in triangular form from the umbo to the inner margin of the hinge-plate, its sides rising in ridges

above the centre and giving the appearance of two, divergent teeth.

- p. I.* less than  $\frac{1}{3}$  the length of the hinge-line, strong, with scarcely perceptible inward curvature; *base* strong but not much swollen; *apex* near the distal end not very prominent, obtuse; *ridges* slightly rounded, umbonal very long, with gradual slope, distal short, and fairly steep.
- p. III.* about  $\frac{1}{2}$  the length of *p. I.*, narrow; *apex* at distal end; *ridges* fairly sharp, umbonal sloping gradually, distal very steeply.
- L.V. a. II.* long, a little more than  $\frac{1}{3}$  the length of the hinge-line, stout, with a slight inward curvature; *base* strong, not much swollen; *apex* distal side of centre, very prominent, conical, blunt; *ridges* fairly sharp, distal short and very steep, umbonal a little longer and less steep.
- 2. not very prominent, triangular, fairly sharp-pointed; *apex* curving outwards and pointing to the umbo; margins raised into ridges, that sometimes give it the appearance of two divergent teeth, separated by a deep triangular fossa from:—
- 4. not very prominent, narrow, sharp, slightly wedge-shaped, running diagonally across the hinge-plate to near the inner margin.
- p. II.* not quite  $\frac{1}{3}$  the length of the hinge-line, strong and narrow, curving with the shell-margin; *base* strong, only slightly swollen; *apex* near the distal end, slightly prominent and distally directed; *ridges* round-edged, umbonal long with fairly gradual slope, distal very short and exceedingly steep.

*Dimensions.*—Long. 11, Alt. 9, Crass. 6·2 mm. These founded on a British specimen, from an unknown locality, are slightly greater than those given by Jenyns, but a specimen from Berlin (Pl. V, f. 16) attains  $11\cdot7 \times 8\cdot2 \times 6\cdot4$  mm., whilst an example from the Pleistocene at Grays (Essex) measures  $11\cdot7 \times 8\cdot7 \times 7\cdot8$  mm.

Jenyns (83, p. 310) discriminated two varieties according to the strength or the reverse of the striae, but these distinctions cannot now be accepted as of any material importance, for the intensity of the striae varies with the locality. Those from the Thames near London are very strongly striate (Pl. V, f. 11), and still more so are certain examples from the Pleistocene of Grays (Pl. V, f. 9) which intermingled with specimens of *P. astartoides* (Pl. V, f. 10) were cited in literature under the name of *P. sulcatum* or *P. amnicum*, var. *sulcata* (*cf.* S. V. Wood, 189, ii, p. 110). On the other hand, the var. *nova*, Paul., from St. Canzian, Ober Krain (Pl. V, f. 17 c), tends to be nearly smooth.

The usual rounded-oval outline may, especially in immature

shells, give place to an elongate oval with comparatively central umbo (Pl. V, f. 12 b & d) or to an elongate form with posteriorly placed umbo as in var. *elongata* (Pl. V, f. 16), or assume a trigonal outline as in var. *nova* (Pl. V, f. 17 d) and certain examples from the Pleistocene of Grays (Pl. VI, f. 4 k, t, u; IX, f. 9). Normally it is a fairly tumid shell (Pl. V, f. 1 & 2), but is sometimes comparatively flattened (Pl. V, f. 3), or in the case of var. *danubialis*, Servain (Pl. V, f. 7 & 8) very swollen.

This last-named variety was first pointed out from the Thames Valley deposits by the late Dr. Boettger in correspondence.

It is longer, narrower and very much more ventricose ( $11\cdot5 \times 8\cdot8 \times 8$  mm.) in the adult stage, although rounder in the very young stages than the type. Indeed the very young stages bear a close resemblance to juvenile *P. nitidum*, and slightly older examples to *P. subtruncatum*, in dentition as well as outline. It is less strongly striate than the typical examples in the same bed, and much more inaequilateral owing to the greater truncation of the posterior end, whilst the umbones, especially in the young shells, are more rounded and prominent. The hinge-plate is also narrower, and there are minor differences in the dentition of the immature shells. Suites are very easily picked out (Pl. VI, f. 3; VII, f. 3 & 4; IX, f. 2, 5-7) and contrast well with similar series of the typical forms from the same localities (Pl. VI, f. 1; VII, f. 1 & 2; IX, f. 3 & 4), but linking forms are also met with (Pl. VI, f. 2).

The only pearl I have seen in a *Pisidium* is in a specimen of this variety from the Pleistocene deposits of Crayford-Erith (Pl. IX, f. 7 c).

The trigonal variant above alluded to from the Pleistocene of Grays is probably the result of dwarfing brought about by uncongenial environment, since it grades into the type (Pl. VI, f. 4). The most pronounced specimens are cardiform in shape and subtriangular in lateral outline, with exceedingly heavy hinge (Pl. IX, f. 9), suggesting at first sight very large examples of *P. supinum*: two of these measure  $7 \times 6 \times 5\cdot4$  and  $6 \times 5\cdot5 \times 4\cdot6$  mm. respectively.

The var. *nova*, Paul. (132, p. 176), is the form that in its adult state departs most widely from the type. Both in external outline and sculpturing (Pl. V, f. 17 d) and to a less extent in its hinge (Pl. VIII, f. 2) it shows a curious approach to *P. casertanum*, but in the younger shells (Pl. V, f. 17 a & b) the suggested resemblance is much less strong, whilst the embryos which I obtained from an individual kindly sent me by Herr Lindholm from the district of Lake Baikal (as *P. subtilestriatum*, Lindh., 95, p. 84) are precisely similar to those of the type form.

## KEY TO THE SYMBOLS FORMING THE MAP.\*

A. = Anglesey.	HD. = Haddington.	PC. = Perth, South (or West)
AM. = Argyll, Main.	HF. = Hereford.	+ Clackmannan.
AN. (Scot.) = Aberdeen, North.	HT. = Herts.	PE. = Peebles.
AN. (Ire.) = Antrim.	HU. = Hunts.	PM. = Perth, Mid.
AR. = Armagh.	I. = Islay, etc. (Ebudes, S.).	PN. = „ North (or East).
AS. = Aberdeen, South.	IM. = I. of Man.	QC. = Queen's County.
AY. = Ayr.	IW. = I. of Wight.	
B. = Bute, Arran and Clyde Is.	KB. = Kirkcudbright.	RA. = Radnor.
BD. = Beds.	KC. = King's County.	RE. = Ross, East.
BF. = Banff.	KD. = Kildare,	RF. = Renfrew.
BK. = Berks.	KF. = Kinross + Fife.	RO. = Rosecommon.
BR. = Brecon.	KI. = Kincardine.	RW. = Ross, West.
BW. = Berwick.	KK. = Kilkenny.	RX. = Roxburgh.
BX. = Bucks.	L. = London Postal District.	S. = I. of Skye, etc. (Ebudes, North).
CA. = Caithness.	L. = Lundy I.	SC. = Scilly Is.
CB. = Cambridge.	LA. = Lanark.	SD. = South Devon.
CD. = Cardigan.	LD. = Londonderry.	SE. = South Essex.
CH. = Cheshire.	LE. = Leitrim.	SG. (Scot.) = Stirling.
CI. = Channel Is.	LF. = Longford.	SG. (Ire.) = South Galway.
CL. = Clare.	LH. = Louth.	SH. = South Hants.
CM. = Caermarthen.	LK. = Limerick.	SI. = Shetlands.
CR. = Caernarvon.	LL. = Linlithgow.	SK. (Scot.) = Selkirk.
CT. = Cantire.	LN. = Lincoln, North.	SK. (Ire.) = South Kerry.
CU. = Cumberland.	LR. = Leicester + Rutland.	SL. (Eng.) = South Lanes.
CV. = Cavan.	LS. = Lincoln, South.	SL. (Ire.) = Sligo.
CW. = Carlow.	M. = Mull, etc. (Ebudes, Mid.).	SN. = South Northumberland.
DB. = Denbigh.	MC. = Mid Cork.	SP. = Salop.
DF. = Dumfries.	ME. = Meath.	SR. = Surrey.
DM. = Durham.	MG. = Montgomery.	SS. (Eng.) = South Somerset.
DN. = Dumbarton.	ML. = Mid. (or West) Lanes.	SS. (Scot.) = South (or West)
DO. = Down.	MM. = Monmouth.	Sutherland.
DT. = Dorset.	MN. = Merioneth.	ST. (Eng.) = Stafford.
DU. = Dublin.	MO. = Monaghan.	ST. (Ire.) = South Tipperary.
DY. = Derby.	MX. = Middlesex.	SW. = South Wilts.
EC. (Eng.) = East Cornwall.	MY. = Mid. West Yorks.	SY. = South-east Yorks.
EC. (Ire.) = East Cork.	ND. = North Devon.	TY. = Tyrone.
ED. (Scot.) = Edinburgh.	NE. = North Essex.	WA. = Waterford.
ED. (Ire.) = East Donegal.	NG. = North Galway.	WC. (Eng.) = West Cornwall.
EI. = East Inverness.	NH. = North Hants.	WC. (Ire.) = West Cork.
EL. = Elgin.	NK. = North Kerry.	WD. = West Donegal.
EK. = East Kent.	NM. = Notts.	WG. = West Galway.
EM. = East Mayo.	NN. = North Northumberland.	WH. = Westmeath.
EN. = East Norfolk.	NO. = Northants.	WI. (Scot.) = West Inverness.
E8. = East Suffolk.	NS. (Eng.) = North Somerset.	WI. (Ire.) = Wicklow.
EX. = East Sussex.	NS. (Scot.) = North (or East)	WK. = West Kent.
EY. = North-east Yorks.	Sutherland.	WL. = Westmorland.
FE. = Fermanagh.	NT. = North Tipperary.	WM. = West Mayo.
FF. = Forfar.	NW. = North Wilts.	WN. = West Norfolk.
FT. = Flint.	NY. = North-west Yorks.	WO. = Worcester.
GE. = Gloucester, East.	OI. = Orkneys.	WS. = West Suffolk.
GM. = Glamorgan.	OX. = Oxford.	WT. = Wigton.
GW. = Gloucester, West.	PB. = Pembroke.	WW. = Warwick.
HB. = Hebrides.		WX. (Eng.) = West Sussex.
		WX. (Ire.) = Wexford.
		WY. = South-west Yorks.

\* The maps and symbols for the vice-counties have been drawn up in accordance with those agreed upon by the British Association Committee for "The formation of a definite System on which Collectors should record their Captures." (Secy. F. Balfour Browne, Esq.)

## DISTRIBUTION.

81

01

		NS	CA	
HB		SS		
S	RW RE EL BF AN			
	WI EI PN AS			
M	AM PM FF KI			
	DW SG PC KF			
I	CT B RF LL ED HD			
	AY LA PE BW NN			
WD ED LO AN	WT KB DF SK RX SN			
FE TY AR DO		CU WL NY DM		
WM SL LE MO	IM	ML MY EY		
EM RO CV LH		SL WY SY LN		
WG NG LF WH ME	A CR DB FT CH DY NM LS			
SG KC KD DU		MN MG SP ST LR CB WN EN		
CL NT QC CW WI		CD RA HF WO WW NO HU WS ES		
NK LK ST KK WX	PB CM BR GE OX BX BD HT NE			
SK MC EC WA		GM MM GW NW BK MX SE		
WC		L NS SW NH SR WK EK		
		ND SS DT SH WX EX		
	EC SD	IW		
SC	WC			

c1

*Pisidium amnicum.*

(Recent occurrences are shown in red: fossil occurrences by a line below the symbols. For the explanation of the symbols see p. 20.)

RECENT.

## ENGLAND.

LONDON.—L.

Battersea [Gray Coll., B.M. 1912. 12. 5: 1-20].

**BERKSHIRE.—BK.** [C. C. S.]

**BUCKINGHAMSHIRE.—BX.**

Eton (River Thames) [J. E. C.]: Denham [J. E. C.]; Halton Canal [J. E. C.]; near Leighton Buzzard [J. E. C.].

CAMBRIDGE-SHIRE.—CB.

Cambridge [Gray Coll., B.M. 1912. 12. 5 : 21-32 & 1912. 12. 13 : 91-100, both as *Pera henslowana*].

## CHESHIRE.—CH.

Beeston Castle (Shrops. Union Canal) [C. O.] ; Bickley (Ellesmere) [C. O.] ; Brooklands [C. O.] ; Marple (Peak Forest Canal) [C. O.] ; near New Mills.

## CORNWALL, WEST.—WC. [Marquand, 107.]

## DERBYSHIRE.—DY.

Dovedale [C. O.] ; Matlock Bridge [A. S. K.]

## DEVONSHIRE, SOUTH.—SD.

Exeter (Canal) [C. O.] ; Newton Abbot (Canal) [B. B. W.]

## DORSET.—DT. [C. C. S.]

## DURHAM.—DM.

Stockton [Alder, 6].

## ESSEX, NORTH.—NE. [C. C. S.]

## ESSEX, SOUTH.—SE.

Buckhurst Hill (R. Roding) [C. O.]

## GLOUCESTERSHIRE, WEST.—GW.

Bristol District [Leipner, 94].

## HAMPSHIRE, SOUTH.—SH.

R. Itchen, Southampton [B.M. 1911. 10. 26 : 7523-56]

## HEREFORDSHIRE.—HF. [Boycott &amp; Bowell.]

## HERTFORDSHIRE.—HT.

Broxbourne [A. S. K.] [J. E. C.] ; Rickmansworth [C. O.]

## KENT, EAST.—EK.

Medway, R. [A. S. K.]

## KENT, WEST.—WK.

Bexley [B.M. 41. 5. 17 : 127-152] ; Bromley (R. Ravensbourne) [A. S. K.] ; Catford [J. E. C.] ; Medway, R. [A. S. K.] ; Sissinghurst [A. S. K.] ; Yalding [A. S. K.]

## LANCASHIRE, MID.—ML. [C. C. S.]

## LANCASHIRE, SOUTH.—SL.

Bolton (Canal) [T. R.] ; Hollinwood (Canal) [C. O.]

## LEICESTERSHIRE.—LR.

Aylestone (Union Canal) [C. O.]

## LINCOLNSHIRE, NORTH.—LN.

Alvingham (Louth Canal) [C. S. C.] ; Bardney (R. Witham) [C. S. C.] ; Louth [C. S. C.]

## LINCOLNSHIRE, SOUTH.—LS.

Bardney (R. Witham) [C. S. C.]

## MIDDLESEX.—MX.

*Passim* [J. E. C.]

## NORFOLK, EAST.—EN. [C. C. S.]

## NORFOLK, WEST.—WN.

Hunstanton [J. E. C.]

## NORTHAMPTONSHIRE.—NO. [C. C. S.]

## NORTHUMBERLAND, SOUTH.—SN. [C. C. S.]

## NOTTINGHAMSHIRE.—NM. [C. C. S.]

## OXFORDSHIRE.—OX. [C. C. S.]

## SHROPSHIRE.—SP. [Buddicom, 28.]

## SOMERSET, NORTH. NS.

Bristol district [Leipner, 94].

SOMERSET, SOUTH.—**SS.** [C. C. S.]

STAFFORDSHIRE.—**ST.**

Froghall (Canal) [C. O.].

SUFFOLK, EAST.—**ES.**

Wenaston [J. E. C.].

SUFFOLK, WEST.—**WS.** [Mayfield, 111.]

SURREY.—**SR.**

Byfleet [J. E. C.]; Thames Ditton [J. E. C.]; Chertsey Mead [B. B. W.]

SUSSEX, EAST.—**EX.** [Jenner.]

SUSSEX, WEST.—**WX.** [C. C. S.]

WARWICKSHIRE.—**WW.**

Sutton Coldfield [H. O.].

WESTMORLAND.—**WL.**

Hale Moss, Burton in Kendal [J. W. J.].

YORKSHIRE, MID-WEST.—**MY.**

Malham Tarn [A. S. K.]; York [B.M. 40. 10. 9 : 91-94].

YORKSHIRE, NORTH-EAST.—**EY.**

York [B.M. 40. 10. 9 : 91-94].

YORKSHIRE, NORTH-WEST.—**NY.** [C. C. S.]

YORKSHIRE, SOUTH-EAST.—**SY.**

York [B.M. 40. 10. 9 : 91-94].

### WALES.

BRECON.—**BR.** [C. C. S.]

PEMBROKESHIRE.—**PB.**

Tenby [C. S.].

### SCOTLAND.

DUMBARTON.—**DN.** [C. C. S.]

HADDINGTONSHIRE.—**HD.**

R. Tyne, below E. Linton [Ann. Scott. Nat. Hist. 1911, p. 184].

PERTHSHIRE, MID.—**PM.**

Towns Lade, Perth [Trans. Perth Soc. Nat. Sci. v, 1910, Proc. p. lix].

PERTH, SOUTH.—**PC.** [C. C. S.]

STIRLING.—**SG.** [C. C. S.]

### IRELAND.

ANTRIM.—**AN.**

Antrim [D. M.]; Neagh, L. [C. S.].

ARMAGH.—**AR.** [Stelfox, 165.]

CARLOW.—**CW.**

Tinnahinch [R. A. P.].

CAVAN.—**CV.** [Stelfox, 165.]

CLARE.—**CL.** [Stelfox, 165.]

CORK, EAST.—**EC.** [Stelfox, 165.]

CORK, MID.—MC. [Stelfox, 165.]

DOWN.—DO. [Stelfox, 165.]

DUBLIN.—DU.

Dublin (Grand Canal) [D. M.].

FERMANAGH.—FE.

Enniskillen [A. S. K.]; Erne, L. [H. T.].

GALWAY, NORTH.—NG. [Stelfox, 165.]

GALWAY, SOUTH.—SG.

Ballinasloe [R. A. P.]; Rea, L. [R. A. P.].

KERRY, NORTH.—NK.

Crotta House [D. M.].

KILDARE.—KD. [Stelfox, 165.]

KILKENNY.—KK. [Stelfox, 165.]

KING'S COUNTY.—KC. [Stelfox, 165.]

LIMERICK.—LK.

Limerick [D. M.].

LONDONDERRY.—LD. [Stelfox, 165.]

LONGFORD.—LF. [Stelfox, 165.]

LOUTH.—LH. [C. C. S.].

MEATH.—ME. [Stelfox, 165.]

QUEEN'S COUNTY.—QC. [Stelfox, 165.]

Rathdowney [R. A. P.].

ROSCOMMON.—RO. [Stelfox, 165.]

TIPPERARY, NORTH.—NT. [Stelfox, 165.]

TYRONE.—TY. [Stelfox, 165.]

WESTMEATH.—WH. [Stelfox, 165.]

## FOSSIL.

### HOLOCENE.

LONDON.—L.

Albert Docks [B.M.—L. 6727]; Blackfriars [B.M.—L. 6745]; between Canning Town and Stratford [B.M. 10045]; Chingford [A. S. K.]; Fulham (Betteridge Road) [B.M.—L. 6740]; Ilford [A. S. K.]; Ladywell, Lewisham [A. S. K.]; Lea Marshes [B.M.—L. 10035]; Lea Valley [B. B. W.] [B.M.—L. 6735, 6751]; N.E. London [B.M.—L. 5717–18, 5720, 5805]; New Scotland Yard [B. B. W.]; Walthamstow [A. S. K.]; West India Docks [M. P. G.]; Westminster [A. S. K.] [B.M.—L. 7570]; Shand Street, Tooley Street [A. S. K.]; Thames Valley [B.M.—L. 333]; Victoria Docks [M. P. G.].

BERKSHIRE.—BK.

Kennet Valley, Newbury [A. S. K. & B. B. W.] [B.M.—L. 7933]; Wallingford [A. S. K.].

ESSEX, NORTH.—NE.

Harwich [A. S. K.].

ESSEX, SOUTH.—SE.

Dagenham [A. S. K.]; Ilford [A. S. K.].

GLOUCESTERSHIRE, WEST.—**GW.**

Westbury-on-Severn [A. S. K.].

HAMPSHIRE, NORTH.—**NH.**

Bentley [A. S. K.].

HAMPSHIRE, SOUTH.—**SH.**

Southampton [Kemp, 86, p. 89].

HUNTINGDONSHIRE.—**HU.**

St. Ives [A. S. K.].

KENT, EAST.—**EK.**

Faversham [M. P. G.].

KENT, WEST.—**WK.**

Near East Farleigh [A. S. K.].

MIDDLESEX.—**MX.**

Brentford [B.M.—L. 7636]; Uxbridge [A. S. K.].

OXFORDSHIRE.—**OX.**

Clifton Hampden [A. S. K.]; Wargrave [A. S. K.].

SOMERSET, NORTH.—**NS.**

Castle Carey [A. S. K.].

SUFFOLK, EAST.—**ES.**

Aldeburgh [B. B. W.]; Blythburgh [A. S. K.].

SUFFOLK, WEST.—**WS.**

Knettishall [A. S. K.].

SURREY.—**SR.**

Near Staines [A. S. K.] [B.M.—L. 6473].

## IRELAND.

GALWAY, SOUTH.—**SG.**

Portumna [A. S. K.].

## AGE DOUBTFUL.

BEDFORDSHIRE.—**BD.**

Bedford [B.M.—L. 6733].

CAMBRIDGESHIRE.—**CB.**

Chatteris [Prestwich Coll., B.M.—L. 23949].

NORFOLK, EAST.—**EN.**

Bacton [B.M.—L. 16486–98 *pars*].

SUFFOLK, EAST.—**ES.**

Sproughton [Prestwich Coll., B.M.—L. 23977 & 23981].

## PLEISTOCENE.

LONDON.—**L.**

Clapton [B. B. W.]; Fulham (Betteridge Rd.) [B. B. W.];

Hackney [B. B. W.]; St. James' Square [B.M.—L. 14878];

Shacklewell Lane [Prestwich Coll., B.M.—L. 14624, 23971];

Spring Gardens (Admiralty) [B.M.—L. 14884]; Stoke Newington [B. B. W.]; Westminster [B. B. W.].

BEDFORDSHIRE.—**BD.**

Biddenham [Prestwich Coll., B.M.—L. 23959].

## CAMBRIDGESHIRE.—CB.

Barnwell [A. S. K. & B. B. W.] [B.M. 48219; L. 328, 332, 334, 5706 & 5708] [M. P. G.]; Barrington [B.M.—L. 5711] [A. S. K.]; Grantchester [S. M. C.].

## ESSEX, NORTH.—NE.

Claeton [A. S. K. & B. B. W.] [B.M.—L. 6684] [M. P. G.].

## ESSEX, SOUTH.—SE.

Grays [A. S. K. & B. B. W.] [B.M.—23456 & 44553] [M. P. G.];

Ilford [A. S. K.] [B.M.—L. 6699 & 10040] [M. P. G.].

## HUNTINGDON.—HU.

Overton Waterville [S. M. C.]; Woodston [C. E. Y. K.].

## KENT, WEST.—WK.

Crayford and Erith [A. S. K. & B. B. W.] [B.M.—L. 6693, 6708, 6740, 6741, 13218 & 18607] [M. P. G.]; Swanscombe [A. S. K. & B. B. W.].

## MIDDLESEX.—MX.

Brentford [B. B. W.]; Ponder's End [A. S. K.]; Twickenham [B.M.—L. 9540].

## NORTHAMPTONSHIRE.—NO.

Overton Longville [Prestwich Coll.: B.M.—L. 23965].

## SUFFOLK, EAST.—ES.

Hoxne [B.M.—L. 6723-24] [A. S. K.]; Stutton [A. S. K.] [M. P. G.].

## SUSSEX, WEST.—WX.

West Wittering [A. S. K.].

## WILTSHIRE, SOUTH.—SW.

Fisherton [B.M.—L. 6717].

## WORCESTERSHIRE.—WO.

Birlingham, near Pershore [A. S. K.]; Crophorne [B.M.—L. 6731] [M. P. G.].

## CROMERIAN.

## NORFOLK, EAST.—EN.

Sidestrands [M. P. G.]; West Runton [A. S. K. & B. B. W.] [M. P. G.].

## SUFFOLK, EAST.—ES.

Kessingland [M. P. G.].

## PLIOCENE (Weybourneian).

## NORFOLK, EAST.—EN.

East Runton [M. P. G.]; North Walsham [M. P. G.].

## PLIOCENE (Norwich Crag).

## NORFOLK, EAST.—EN.

Bramerton Common [N. M.] [S. V. Wood Coll.: B.M.—L. 4540] [M. P. G.], Thorpe, near Norwich.

## SUFFOLK, EAST.—ES.

Beccles [Crowfoot]; Bulchamp [S. P. Woodward]; Southwold [S. V. Wood].

On the Continent this species occurs living throughout Europe as far south as Naples (12, p. 43), and eastwards extends through Siberia north of the Altai to Lake Baikal, whence it has been described under the name of *P. baicalense* and its variety *nova* as *P. subtilestriatum*, Lindholm (95, p. 84). It has further been recorded from Algiers by Morelet (122, p. 298).

In the fossil state it has been reported from the Holocene of Germany [Sandberger (154, p. 951)]; the Holocene and Pleistocene of Denmark [Johansen (85, p. 9)]; the Pleistocene of Gorkum, Holland [Harting (76, p. 117), Lorie (101, p. 163)]\*, the Pleistocene (Campinien) of Brussels [Mus. Hist. Nat., Brussels]; the Pleistocene (Mosbacher Sand) of Mosbach vor Biebrich (near Wiesbaden) [Sandberger (154, p. 951), A. Braun (23, p. 144), and Prestwich Coll., B.M. 48212], of Hohensachsen and Pilgerhaus (near Weinheim-an-der-Bergstrasse) [Wüst Coll.], and of Mauer (near Heidelberg) [Geyer (69, p. 96)]. Also in France from the Upper Pliocene of Bligny (near Dijon), the Loess at Menchecourt (Pleistocene) [Prestwich Coll., B.M.—L. 14874—76] and the sands at St. Acheul [Prestwich Coll., B.M.—L. 14877], and from Charonne, near Paris [Prestwich Coll., B.M.—L. 23984].

## 2. *Pisidium astartoides*, Sandberger.

[Pls. I, f. 2; III, f. 2; V, f. 10; X-XII.]

- 1840. *Cyclas (Pisidium) amnica*, var.? : Lyell, Lond. & Edinb. Phil. Mag. Ser. III, xvi, pp. 363 & 364, figs.; *id.*, Antiq. Man, 1863, p. 217, figs. p. 218.
- 1851. *Pisidium amnicum*, var. *sulcatum*: S. V. Wood, Crag Moll. ii, p. 110.
- 1864. *Pisidium antiquum*, n. sp. : Von Martens, Zeitschr. Deutsch. Geol. Gesell. xvi, p. 349. [*Non* Braun, 1851.]
- 1880. *Pisidium astartoides*, Sandberger, Palaeontographica, N. F. vii. (=xxvii), p. 96, pl. xii, f. 1—1 e.

This fossil species seems to have been first detected in the Fresh-water Beds at West Runton, Norfolk, in 1840 by Sir C. Lyell who figured it (102, p. 364) with a query as a variety of *P. amnicum*, and noted its presence also at Grays. Later on he recognized the same form as occurring at Ilford (103, pp. 217—218). Dr. S. P. Woodward included it in his collection with strongly striate specimens of *P. amnicum* from Grays under the name *P. sulcatum*.

Its specific distinctness was first held by Von Martens (108, p. 349), but unfortunately the name *antiquum* which he bestowed

\* Not Pliocene as erroneously recorded by Kennard and Woodward (87, p. 202).

on it was preoccupied by A. Braun (24, p. 1116) for a Miocene form, subsequently figured by Sandberger (153, pl. xxvi, f. 7), so that its present name conferred by Dr. F. Sandberger in 1880 (154 A, p. 96) stands. His description, founded on specimens from the original locality of West Runton, reads:—

“Testa solida, subcordiformis, extus costis concentricis imbricatis distantibus ornata, sulcis latis subtiliter striatis disjunctis. Umbones lati, depresso, submedianus; fossula ligamentalis brevis, sat profunda. In valva dextra dens cardinalis posticus tenuis obliquus et anticus bifidus, compresso-trangularis, in sinistra posticus tenuis arcuatus et anticus crassus bifidus, obtuso-triangularis conspiciuntur. Dentes laterales diversi, inferi in valvis ambabus conformes, obtuso-triangularis prominuli, superi in dextra solum conspicui et fossulis sinistriæ excepti parvuli, obtusi. Alt. 7, Long. 9, Crass. 5 mm.”

It will be noticed that Sandberger has confused the left and right valves, forgetting for the moment the peculiar conformation of the shell in this genus, and further deceived by the deep notch in the cardinal tooth (3) of the right valve describes it as two.

The details of the hinge are as follows:—

*Hinge* (Pl. I, f. 2; III, f. 2) about  $\frac{3}{4}$  the length of the shell, broad, not projecting much inwards save at the umbo, strong, well curved, with two marked flexures in the right valve.

- R. V. a. 1. about  $\frac{1}{3}$  the length of the hinge-line, very stout and strong, curving inwards; *base* very strong and swollen, especially on the umbonal side; *apex* central, very prominent, inclined inwards, rounded obtuse; *ridges* rounded, sloping about equally and not very steeply, the umbonal descending a little lower than the distal.
- a. III. about half the length of a. 1., from which it is separated by a deep sulcus, stout, strong, erect, curving with the shell-margin; *apex* about central, prominent, rounded obtuse; *ridges* somewhat rounded, descending about equally and fairly gradually.
- 3. sharply curved and flexed, strong, prominent, flat-topped, notched at the angle, *a* slanting diagonally forwards across the hinge-plate, *b* similarly inclined backwards, slightly wedge-shaped and deeply sulcate.
- p. 1. about  $\frac{1}{3}$  the length of the hinge-line, fairly stout, very strong, distal end curving inwards; *base* very strong, slightly swollen; *apex* central, very prominent rounded obtuse; *ridges* somewhat rounded, descending about equally and fairly steeply.
- p. III. about  $\frac{1}{2}$  the length of p. 1., to which it is slightly inclined, their umbonal extremities tending to become confluent,

rather narrow, erect, curving with the shell-margin; *apex* central, prominent, rounded obtuse; *ridges* somewhat rounded, descending about equally and fairly gradually.

- L. V. *a. II.* nearly  $\frac{1}{2}$  the length of the hinge-line, stout, very strong, straight; *base* very strong and swollen; *apex* central, exceedingly prominent, pointed obtuse; *ridges* fairly sharp, descending about equally, at first steeply, then very gradually.
2. very prominent, triangular in the young shell, base continuous with that of *a. III.*, apex pointing to the umbo; with growth the sides of the triangle fold back more and more till they form a wedge-shaped prominence closely resembling *3 b* in the opposite valve; in very old shells the mark of the fold becomes obliterated.
4. lamelliform, sharp, running diagonally backwards across the hinge-plate from the umbo..
- p. II.* less than  $\frac{1}{3}$  the length of the hinge-line, narrow, strong, curving with the shell-margin; *base* strong, slightly swollen; *apex* central, exceedingly prominent, rounded obtuse; *ridges* sharp, descending about equally, fairly steeply at first, then becoming almost horizontal.

The finest examples seem to come from the Cromerian at West Runton, one from the peat measuring Long. 9·4, Alt. 9, Crass. 6·6 mm., whilst one from the gravel is 9 × 9·3 × 5 mm. The specimens from Grays rank next in size.

The species may readily be distinguished from its close ally *P. amnicum* by its rounder outline and by the greater strength of the external striae which stand up boldly especially on the very umbo (Pl. X, f. 7), whereas in *P. amnicum* they are by no means strongly marked on the young shell even in the strongly striated examples from Grays (*cf.* Pl. V, f. 9 & 10).

In the hinge of the right valve the paired lateral teeth are not so parallel as in *amnicum* but curve towards each other enclosing a very deep fossa, whilst in the left valve the cardinals 2 and 4 are separated by a deeper fossa than in *amnicum*, and 2 is not so sharp pointed.

*P. astartoides* does not show any extreme variation in form as do some of the other species of the genus. The earlier forms from the Cromerian, both from the peat (Pl. X, f. 4) and from the gravel (Pl. XI, f. 1; XII, f. 8), are the rounder and the more strongly sculptured. Specimens obtained at Swancombe (Pl. XI, f. 2; XII, f. 1) come next; but are more finely sculptured. At Grays the form tends to become ovate-trigonal (Pl. X, f. 3; XII, f. 2); whilst at Crayford-Erith (Pl. IX, f. 1; XII, f. 4) they are far more oval, the extreme in this direction being met with at Clacton (Pl. X, f. 2; XII, f. 5).

## DISTRIBUTION.

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WD ED LD AN	WT KB DF SK RX SN		
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*Pisidium astartoides.*

(Recent occurrences are shown in red: fossil occurrences by a line below the symbols. For the explanation of the symbols see p. 20.)

## PLEISTOCENE.

LONDON.—**L.**

N.E. London [B.M.—L. 5805]; Clapton [B. B. W.]; Hackney [B. B. W.]

ESSEX, NORTH.—**NE.**

Clacton [A. S. K. & B. B. W.] [B.M.—L. 6683 & 6685] [M. P. G.]

ESSEX, SOUTH.—**SE.**

Grays [A. S. K. & B. B. W.] [B.M. 44553 & L. 7931] [M. P. G.]; Ilford [B.M.—L. 10041] [M. P. G.]

KENT, WEST.—**WK.**

Crayford and Erith [A. S. K. & B. B. W.] [B.M.—L. 18606 (figd.)] [M. P. G.]; Swanscombe [A. S. K. & B. B. W.]

## CROMERIAN.

## NORFOLK, EAST.—EN.

Cromer, to west of [M. P. G.]; West Runton [A. S. K. & B. B. W.] [M. P. G.].

## SUFFOLK, EAST.—ES.

Kessingland [M. P. G.].

## PLIOCENE.

## NORFOLK, EAST.—EN.

Bramerton Common [N. M.].

The first record of this species on the Continent appears to have been due, as already noted, to E. Von Martens, who described it in 1864 (108, p. 349) under the name of *P. antiquum*, from deposits on the banks of the Irtisch, near Omsk. In Denmark it has been found in Pleistocene deposits at Forslevgaard (Sjælland) and Copenhagen (Johansen, 85, pp. 9, 57, 58 & 67).

The late Dr. Boettger possessed specimens from the Pleistocene (Mosbach Sand) at Messel (near Darmstadt) and Schierstein-a.-Rhein (near Wiesbaden); while Dr. Wüst has further recorded it (196) from Mosbach (near Wiesbaden) itself, Mauer (near Heidelberg) and Hohensachsen (near Weinheim-an-der-Bergstrasse).

3. *Pisidium casertanum* (Poli).

[Pls. I, f. 3–6; III, f. 3; XIII.–XVIII.]

1791. *Cardium casertanum*: Poli, Test. utr. Siciliæ, i, ord. II., p. 65, pl. xvi f. 1.
1826. *Cyclas vitrea*, n.: Risso, Hist. Nat. Europe mérid. iv, p. 338.
1830. *Cyclas prisca*, m.: Eichwald, Naturh. Skizze von Lithauen, p. 207.
1836. *Pisidium australe*, n. sp.: Philippi, Enum. Moll. Siciliæ, i, p. 39, pl. xiv, f. 11. [*Cf.* Pl. XIII, f. 32; XV, f. 13.]
1838. *Pisidium cinereum*: Alder, Trans. Nat. Hist. Soc. Northumbld., ii, p. 341. [*Cf.* Pl. XIII, f. 10 & 16; XV, f. 7 & 10.]
1840. *Galileja tenebrosa*, n. gen., n. sp.: Costa, Faun. Sicil. i, Moll. p. 1, pl. i, f. 2 a, A, B. [Pl. XIII, f. 27; XV, f. 18.]
1843. *Cyclas cinerea*, Alder: Hanley, Cat. Rec. Bivalve Shells, p. 91.
- *Pisidium roseum*, m.: Scholtz, Schlesien's Moll. p. 140: *P. fontinale*, b. *roseum*, *id.*, *op. cit.* suppt. (1853) p. 16. [Pl. XIII, f. 9 XV, f. 11.]
1844. *Cyclas lenticularis*, nob.: Normand, Notice Cyclades Valenciennes, p. 8, pl. f. 7 & 8. [*Cf.* Pl. XIII, f. 29; XVI, f. 10.] [*Cf.* specimens from Baudon in Norman Coll., B.M. 98.5.20: 22330–35.]
1846. *Pisidium vitreum*, Pfeiffer: Verany in "Descrizione di Genova," i, pt. 2, p. 93.
1849. *Pisidium limosum*, nob.: Gassies, Tabl. Moll. Agenais, p. 206, pl. ii, f. 10.
- *Pisidium amnicum*, Jenyns: var. *B. nitida?* spec. nov.; *id., tcm. cit.* p. 208 [= *intermedium*, Gassies, *v. infra*].
- *Pisidium caliculatum*: Dupuy, Cat. extram. Galliae Test. [4] No. 229; *id., Hist. Nat. Moll. France*, 1852, p. 684, pl. xxx, f. 4.

1849. *Pisidium iratianum*: *id., loc. cit.* No. 234. (A syn. for *P. cinereum*, *id.*, Hist. Nat. Moll. France, 1852, p. 683.)
- *Pisidium thermale*: *id., loc. cit.* No. 238; *id.*, Hist. Nat. Moll. France, 1852, p. 682, pl. xxx, f. 6. [*Cf.* specimens from Dupuy in Norman Coll., B.M. 98. 5. 20: 22346-49.]
1852. *Pisidium lenticulare*, Norm.: Dupuy, Hist. Nat. Moll. France, p. 680, pl. xxx, f. 2. [*Cf.* specimens from Clessin & Baudon in Norman Coll., B.M. 98. 5. 20: 22321-35.]
- *Pisidium pulchellum* [non Jenyns]: *id., op. cit.* p. 638, pl. xxx, f. 5.
- *Pisidium priscum*, m.: Eichwald, Lethæa Rossica, iii, p. 87, pl. v, f. 8 a-c.
1854. *Pisidium grateloupianum*, nob.: Normand, Coup d'œil Cyclades Nord, p. 4.
- *Pisum casertanum*, Poli: Deshayes, Cat. Conch. Brit. Mus. ii, p. 275.
- *Pisum vitreum*, Risso [*pars*]: *id., loc. cit.*
- *Pisum lenticulare*, Norm.: *id., tom. cit.* p. 280.
- *Pisum australe*, Phil.: *id., tom. cit.* p. 276.
1855. *Pisidium intermedium*, nob.: Gassies, Actes Soc. Linn. Bordeaux, xx, p. 338, pl. i, f. 4. [Olim *Pisidium amnicum*, Jenyns, var. *B. nitida* Gassies, *q. v. supra.*] [*Cf.* specimens in Norman Coll., B.M. 98. 5. 20: 22403-10.]
- *Pisidium pallidum*, nob.: *id., tom. cit.* p. 343, pl. i, f. 10. [*Cf.* specimens in Norman Coll., B.M. 98. 5. 20: 22429-34.]
1856. *Pisidium amnicum*, vars.  $\epsilon$ . *nitidum*,  $\zeta$ . *intermedium*,  $\eta$ . *grateloupeanum* [*sic*]: Moquin-Tandon, Hist. Nat. Moll. France, ii, p. 583.
- *Pisidium cazertanum*, Poli: *id., tom. cit.* p. 584.
1857. *Pisidium amnicum*, var. *grateloupianum*, Norm.: Baudon, Mém. Soc. Acad. Oise, iii, pp. 349 & 355, pl. iv, f. E.
1858. *Musculium australe*, Phil.: Adams, Gen. Rec. Moll. ii, p. 451.
- *Musculium casertanum*, Poli: *id., tom. cit.* p. 451.
- *Musculium lenticulare*, Normand: *id., tom. cit.* p. 451.
- *Pisum lenticulare*, Normand: *id., tom. cit.* p. 660.
- *Musculium roseum*, Scholtz: *id., tom. cit.* p. 452.
- *Pisum roseum*, Scholtz: *id., tom. cit.* p. 660.
- *Musculium tenebrosa* [*sic*], Da Costa: Adams, Gen. Rec. Moll. ii, p. 452.
- *Pisum tenebrosa* [*sic*], Da Costa: *id., tom. cit.* p. 660.
- *Musculium vitreum*, Risso: *id., tom. cit.* p. 452.
- *Pisum vitreum*, Risso: *id., tom. cit.* p. 660.
1859. *Pisidium casertanum*, var. *B. limosum* [*sic*]: Gassies, Actes Soc. Liun. Bordeaux, xxii, p. 301.
- *Pisidium henslowianum*, var. *cinerea*: Jeffreys, Ann. & Mag. Nat. Hist. III, iii, p. 37.
- *Pisidium pusillum*, var. *casertana*: *id., loc. cit.*
1862. *Pisidium fontinale*, var. *cinerea*: Jeffreys, Brit. Conch. i, p. 21.
- *Pisidium cuneatum*: Bielz, Verhandl. Siebenb. Ver. Naturw. xiii, p. 220. [*Cf.* specimens from Bielz in Norman Coll., B.M. 98. 5. 20: 22261-7.]
1873. *Pisidium ibericum*, n. sp.: Clessin, Malakozool. Blätt. xx, p. 29, pl. i, f. 4.
- *Pisidium fossarinum*, Cless.: *id.* in Westerlund, Fauna Moll. Sveciæ, &c., p. 544.
1874. *Pisidium obliquatum*, n. sp.: *id.* in Fedchenko, Izvyst. Imp. Obshest. Lyubit. Estestvoz. Antrop. i Etnogr. Moskva, xi, vuip. I, p. 36, pl. iii, f. 31.
- *Pisidium acuminatum*, n. sp.: *id., op. cit.* p. 37, pl. iii, f. 32.

1874. *Pisidium pulchellum*, Jenyns: *id.* in Küster, Syst. Conch.-Cab. ix, abth. 3, Cycladeen, p. 23, pl. ii, f. 13-15 [*non* Jenyns].  
 — ? *Pisidium hispanicum*, Clessin: *id.*, *op. cit.* p. 37, pl. iv, f. 4-6.  
 — ? *Pisidium moreanum*, Clessin: *id.*, *op. cit.* p. 38, pl. iv, f. 7-9.  
 — ? *Pisidium heldreichii*, Clessin: *id.*, *op. cit.* p. 38, pl. iv, f. 10-12.  
 — *Pisidium italicum*, Clessin: *id.*, *op. cit.* p. 40 pl. iv, f. 16-18, [*Cf.* specimens in Norman Coll., B.M. 98.5.20: 22403-10.]  
 — *Pisidium rivulare*, Clessin: *id.*, *op. cit.* p. 30, pl. iii, f. 7-11. [Specimens from the author in Norman Coll., B.M. 98.5.20: 22503-06.]
1876. *Pisidium sordellianum* [n. sp.]: Pini, Bull. Soc. Malac. Ital. ii, p. 185.  
 — *Pisidium nordenskioldi*, nov. sp.: Clessin in Westerlund, Nachrichtsbl. Deutsch. Malakoz. Gesell. viii, p. 103; *id.*, K. Svensk. Vet.-Akad. Handl. II, xiv, No. 12, p. 68 [pl. f. 20].  
 — *Pisidium sibiricum*, nov. sp.: *id.*, in Westerlund, Nachrichtsbl. Deutsch. Malakoz. Gesell. viii, p. 103; *id.*, K. Svensk. Vet.-Akad. Handl. II, xiv, No. 12, p. 69 [pl. f. 21].  
 — *Pisidium boreale*, nov. sp.: *id.*, in Westerlund, Nachrichtsbl. Deutsch. Malakoz. Gesell. viii, p. 103; *id.*, K. Svensk. Vet.-Akad. Handl. II, xiv, No. 12, p. 70 [pl. f. 23].
1877. *Pisidium hermimi*, Welwitsch: *id.* in Küster, Syst. Conch.-Cab. ix, abth. 3, Cycladeen, p. 61, pl. vii, f. 12-14.  
 — *Pisidium ovatum*, n. sp.: *id.*, *op. cit.* pl. viii, f. 22-24. [*Cf.* specimens in Norman Coll., B.M. 98.5.20: 22399-402.]
1880. *Pisidium targionianus* [sic]: Paulucci, Bull. Soc. Malac. Ital. vi, p. 176.
1888. *Pisidium lindstroemi*, n. sp.: Clessin, Övers. K. Vet.-Akad. Handl. Stockholm, 1888, p. 340, figs.
- 1893 ? *Pisidium arcticum*, n. sp.: *non* 1883, Westerlund, Nachrichtsbl. Deutsch. Malakoz. Gesell. 1893, p. 132.  
 — *Pisidium nucleatum*, n. sp.: Benoit in Locard, Coquil. Eaux douces France, p. 142.
1896. *Pisidium impar*, m.; Westerlund, Ann. Mus. Zool. Acad. Imp. Sci. St. Petersb. 1896, p. 198.
1899. *Pisidium xantholenum*, Castro in coll.; Locard, Arch. Mus. Hist. Nat. Lyon, vii, No. 1, p. 209.
1902. *Pisidium maculatum*, n. sp. | *Pisidium trigonides*, n. sp. | Dybowski, Nachrichtsbl. Deutsch. Malakoz. Gesell. xxxiv, pp. 94 & 95; Rossmässler, Icon., N. F. x, f. 1807 & 1809.
1909. *Pisidium dubium*, n. sp.: Lindholm in Korotneff, Wissenschaft. Ergebn. Zool. Exped. Baikal-See, iv, p. 85, pl. ii, f. 45, 46.

The form has long passed on the Continent almost equally under the names of *P. casertanum* and *P. fontinale*. What the original of the last name was will now never be known for Lamarck's diagnosis is far too brief, whilst the specimens that Draparnaud associated with Lamarck's name have been lost, and his descriptions are too vague and his figures too poor to permit of any definite conjecture \*. Fortunately there is no need to speculate further on

\* Locard suggests (99, p. 158) that f. 11 & 12 of the text to pl. x (=f. 12 & 13 of the plate) may belong to *P. casertanum*, Poli, whilst the other figures can not be precisely defined. Personally I would doubtfully refer nos. 8, 9, & 12 of the text (=9, 10, & 13 of the plate) to the present species.

the subject, for Prof. R. Bellini most kindly sent me specimens from Poli's original locality at Caserta, of the only *Pisidium* there found. These undoubtedly belong to the present form and show that Poli was dealing with dead and bleached specimens rather rounder in lateral outline than the majority of those met with. Poli's diagnosis (138, i, ord. II, p. 65) is as follows :—

“ *Testæ characteres.* Testa subrotunda, convexiuscula, glabra, fragilissima, striis tenuissimis confertisque transversim distincta.

*Testæ descriptio.* Testa subrotunda, transversim paulo oblongata, tumidiuscula, exigua. Valvæ glabræ, maxime fragiles, striis exilissimis lente conspicuis confertisque, perinde ac annotinis accessionibus, exaratae conspiciuntur. Tota concha niveo candore nitet.

Naturalis hujus conchæ magnitudo via duas tresve lineas excedit. Nos vero longe ampliorem delineavimus ad ipsam clarius repræsentandam.

*Historia.* Cardium hoc in rivuli alveo per regium Casertæ nemus præterfluentis simul cum aliis testis fluviatilibus invenimus animante destitutum.”

Baudon seems to have been the next, of the few who clearly discriminated this species, to give a really good description (9, p. 343), and since it supplies much that is wanting in Poli's it may well be quoted :—

“ Concha mediocris aut exigua, variabilis, ovata, vix elongatula, parum subventricosa, antice subrostrata, posterius subrotunda, inferius curvata, griseo lutescenti colore induta; margine valvulis clausis acutâ; apice vix prominente; striis tenuibus et sat regulariter distributis; commissurâ angustâ; arcuatâ; dentibus cardinalibus augustis [sic], sublamellosis. Ligamento brevi, flavo vel brunneo, debili.”

To this may now be appended a detailed description of the hinge-characters :—

*Hinge* (Pl. I, f. 3-6; III, f. 3) about  $\frac{3}{4}$  the length of the shell, very strong and wide, projecting well inwards, very arched, with two flexures in the right valve of which the anterior one is the more marked.

R.V. *a. I.* about  $\frac{5}{12}$  the length of the hinge-line, very strong, curved and inclined inwards; *base* very strong, somewhat swollen; *apex* on distal side of centre, prominent, acuminate, distally directed; *ridges* rounded, distal steep, especially at first, umbonal fairly steep and descending to a lower level than the distal.

*a. III.* about  $\frac{1}{4}$  the length of, and parallel to *a. I.*, straight, narrow, erect; *apex* central, prominent, rounded obtuse; *ridges* compressed, sloping away equally and not steeply.

3. prominent, arcuate, flat-topped; *a* thin, sharp, fairly parallel to shell-margin; *b* thickened, strongly sulcate, curving diagonally across the hinge-plate almost to its inner margin.

*p. I.* about  $\frac{1}{3}$  the length of the hinge-line, strong, straight, compressed; *base* strong, straight; *apex* near the distal end, not very prominent, pointed obtuse; *ridges* fairly sharp, sloping away fairly equally and steeply, the umbonal descending a trifle lower than the distal.

*p. III.* about  $\frac{1}{3}$  the length of, and parallel to *p. I.*, straight, narrow, erect; *apex* distal side of centre, prominent, acuminate; *ridges* compressed, umbonal sloping fairly gradually, distal steeply.

L.V. *a. II.* about  $\frac{5}{12}$  the length of the hinge-line, narrow, straight; *base* strong, not much swollen; *apex* central, very prominent, acuminate; *ridges* fairly sharp, distal very steep at first, then sloping gradually, umbonal steep, descending to a lower level than the distal.

2. very prominent, sharply triangular, its base parallel with the hinge-plate and continuous with that of *a. II.*, the apex curving outwards and twisted spirally (sometimes considerably) points towards the posterior dorsal margin.

4. lamelliform, sharp, curving diagonally back at a high angle across the hinge-plate to almost its inner margin.

*p. II.* about  $\frac{1}{3}$  the length of the hinge-line, narrow, strong, curving with the shell-margin; *base* strong and straight; *apex* near distal end, very prominent, distally directed, acuminate; *ridges* almost sharp, umbonal descending fairly steeply, distal very steep at first, then gradually sloping.

*Dimensions.*—Two of the finest examples seen are in the collection of Mr. C. Oldham. One from Fitton Hall, Oldham (Lancs.), measures:—Long. 7, Alt. 6, Crass. 4 mm.; the other from Marsworth Reservoir (Herts.) is 6.5 × 5.5 × 4 mm.

In external conformation this is a most variable species and may at times, especially when dwarfed, resemble forms of *P. pusillum* (*e. g.* Pl. XIII, f. 25; XVI, f. 12), *P. personatum* (*e. g.* Pl. XIII, f. 19 *b*; XVI, f. 6 *a* & *b*) and even *P. nitidum* (*e. g.* Pl. XIV, f. 7 *b* & *d*).

Its leading characters are its usually larger size as compared with its congeners, and the fact that its greatest anterior projection lies rather below a lateral line taken through the adductor scars. The sharp anterior flexure of the hinge, especially in the right valve, with the disposition of the lateral teeth instantly distinguish it, as does the position of the cardinals (2 & 4) in the left valve which are placed well athwart the hinge-plate (Pl. XV, f. 3). In *P. personatum* and *P. nitidum* these teeth are on the other hand fairly parallel with the hinge-line.

What I would regard as the type form is represented by those figured from Addington in Surrey (Pl. XIII, f. 15; XV, f. 15) or Gateshead in Durham (Pl. XIII, f. 16; XV, f. 7) and again from Wniana in Roumania (Pl. XIII, f. 8 & 31; XVI, f. 15) and Naples (Pl. XIII, f. 32; XV, f. 13). In the Sebeto at the last-named locality an extremely oval form is met with (Pl. XIII, f. 7 & 30; XVI, f. 16). This is closely paralleled by specimens from the Pleistocene at Uxbridge. The normal tumidity of the species is shown in Pl. XIII, f. 1 & 4, whilst f. 2 & 3 are inflated examples and f. 5 & 6 instances of greatest compression.

There is one well marked form, a lake or still-water form, which almost amounts to a variety. In this the shell is rounder than the type, and more compressed (Pl. XIII, f. 5, 17, 23, 25 & 26) whilst the hinge being narrower and lighter is less arcuate and the flexure less pronounced. The cardinals, though still retaining their distinctive characters, are, owing to the reduced width of the hinge-plate, forced into a position more or less parallel therewith (Pl. XV, f. 5); the lateral teeth on the other hand, beyond being somewhat lighter, remain as in the type (Pl. XVI, f. 3-6 & 12).

It is among the fossil examples especially from the Pleistocene of the Thames Valley, where individuals that lived under varying conditions have been swept together by the great river, that the greatest variation in shape is met with, and interesting series can be picked out (Pl. XIV, f. 4, 5, 7 & 8; XVII, f. 1-4). Some specimens are almost orbicular, whilst others are subtrigonal in outline (Pl. XVII, f. 3 t). The latter are curiously paralleled by examples sent me by Herr Lynge from Lyngby-Bagsvær Sø, Seeland (Pl. XV, f. 20 e, g). Herr Lynge, however, was not able to point to any notable peculiarity of the environment that could have led to the production of this extreme form.

The most triangular examples met with come from the Pleistocene at Grays (Pl. XVIII, f. 12 i, k, l), where at times they are hard to distinguish on account of the thickened dentition from the associated *P. supinum*. The nearest living individuals resembling them are some from Devonshire (Pl. XV, f. 16; XVI, f. 2 a, b).

Individuals showing a more or less complete exchange of hinge formula for the two valves are sometimes met with, as in other species of the genus. The most striking example is that from Newtownards, Co. Down (Pl. XVI, f. 7 & 8), in which the right valve has a single anterior and double cardinal teeth, whilst the left valve has the lateral teeth doubled. Among fossil forms two right valves from the Pleistocene of Swanscombe (Pl. XVII, f. 3 q & s) have each a single anterior lateral, and one (Pl. XVIII, f. 7) has both laterals single, whilst a left valve (Pl. XVII, f. 4 p) has a double anterior lateral. In an abnormal right valve from the Holocene of Elie, Fifeshire (Pl. XVIII, f. 6) there is a single in lieu of a double posterior lateral.

Specimens marked "*P. cinereum*, British" are in the Hanley collection (B.M. 1907. 12. 30 : 524-5) and may have furnished the figure in Forbes and Hanley (63, pl. xxxvi, f. 2).

## DISTRIBUTION.

81

OI

NS CA

HB

SS

S	RW	RE	EL	BF	AM		
	WI	EI	PN	AS			
M	AM	PM	FF	KI			
	DN	SG	PC	KF			
I	CT	B	RF	LL	ED	HD	
			AY	LA	PE	BW	NM

WD	ED	LD	AN	WT	KB	DF	SK	RX	SN
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EE	TY	AR	DO	IM	CU	WL	NY	DM	
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WM	<u>SL</u>	LE	MO		ML	MY	EY		
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EM	RO	CV	LH		SL	WY	SY	LN	
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WG	<u>NG</u>	LF	WH	<u>ME</u>	A	DB	FT	CH	DY	NM	LS
----	-----------	----	----	-----------	---	----	----	----	----	----	----

SG	KC	<u>KD</u>	DU		MN	MG	SP	ST	LR	<u>CB</u>	WN	EN
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CL	NT	QC	CW	WI	CD	RA	HF	<u>WO</u>	WW	NO	HU	WS	ES
----	----	----	----	----	----	----	----	-----------	----	----	----	----	----

NK	<u>LK</u>	ST	KK	WX	PB	CM	BR	GE	OX	<u>RX</u>	<u>BD</u>	HT	<u>NE</u>
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SK	MC	EC	WA		GM	MM	<u>GW</u>	NW	<u>RK</u>	<u>MX</u>	SE		
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WC				L	NS	<u>SW</u>	NH	<u>SR</u>	<u>WK</u>	EK		
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SC WC

CI

*Pisidium casertanum.*

(Recent occurrences are shown in red: fossil occurrences by a line below the symbols. For the explanation of the symbols see p. 20.)

## RECENT.

## ENGLAND.

LONDON.—L.

Barnes Common [B. B. W.]; Blackheath [B.M. 98.5.20 : 22517-35 pars]; East Finchley [J. E. C.]; Hendon [J. E. C.]; North End [B. B. W.].

BERKSHIRE.—BK.

Cothill [H. C. N.]; Wendover Canal [C. O.].

BUCKINGHAMSHIRE.—BX.

Denham [J. E. C.]; Weston Turville [J. E. C.].

## CHESHIRE.—CH.

Ashton-on-Mersey [C. O.]; Baguley [C. O.]; Beeston Castle [C. O.]; Birkenhead [E. R. S.]; Brooklands [C. O.]; Budworth [A. S. K.]; Fulshaw [C. O.]; Heswall [C. O.]; Knutsford [C. O.]; Lostock Graham [C. O.]; Lyme Park [C. O.]; Marple Park [C. O.]; Marston [C. O.]; Mobberley [C. O.]; Northern Etchells [C. O.]; Romiley [C. O.].

## CUMBERLAND.—CU.

Abbey Holme [J. L.]; Allonby [W. J. F.]; Bassenthwaite [W. J. F.]; Rickerbybeck [J. L.].

## DERBYSHIRE.—DY.

Buxton [C. O.].

## DEVONSHIRE, NORTH.—ND.

Morthoe district [J. L.]; Shirwell [B. B. W.].

## DEVONSHIRE, SOUTH.—SD.

Newton Abbot (Canal) [B. B. W.].

## DURHAM.—DM.

Butterwick [B.M. 1911. 10. 26 : 7579-94]; Castle Eden [B.M.]; near Darlington [E. R. S.] [H. C. N.]; Gateshead [C. O.] [T. R.]; Winston [C. O.].

## ESSEX, NORTH.—NE.

Colchester [W. M. W.].

## ESSEX, SOUTH.—S.E.

Shenfield [W. M. W.].

## HAMPSHIRE, SOUTH.—SH.

R. Itchen, Southampton [B.M. 1911. 10. 26 : 7773].

## HERTFORDSHIRE.—HT.

Marsworth Reservoir [C. O.]; St. Albans (R. Ver) [C. O.]; Watford [C. O.] [B.M.].

## KENT, EAST.—EK.

Sissinghurst [A. S. K.].

## LANCASHIRE, MID.—ML.

Burrow Height [J. W. J.]; Lancaster [A. S. K.].

## LANCASHIRE, SOUTH.—SL.

Manchester [A. S. K.]; Oldham [T. R.] [B.M. 98-6-6 : 59-74] [C. O.] [W. M. W.] [H. O.]; Oldham (Hill 700') [F. T.]; Stanley, Liverpool [C. O.]; Swinton [T. R.] [W. M. W.].

## LEICESTERSHIRE.—LR.

Staverton [A. S. K.].

## LINCOLNSHIRE, NORTH.—LN.

Louth (Burwell Wood) [C. S. C.]; Ruckland [C. S. C.]; South Kelsey [C. S. C.].

## MIDDLESEX.—MX.

Bushey Park [J. E. C.]; Hadley Wood [J. E. C.]; Uxbridge [J. E. C.].

## NORFOLK, WEST.—WN.

North Wootton [J. E. C.].

## NORTHUMBERLAND.—NN &amp; SN.

[Loc. ? B.M. 1911. 10. 26 : 7612-25.]

## NORTHUMBERLAND, NORTH.—NN.

Bamborough [C. O.].

## NORTHUMBERLAND, SOUTH.—SN.

Newcastle [Gray Coll., B.M. 1912. 12. 5 : 33-42].

## NOTTINGHAMSHIRE.—NM.

Sutton [C. O.].

## OXFORDSHIRE.—OX.

Marston Copse [H. C. N.] ; Oxford [H. C. N.].

## SHROPSHIRE.—SP.

Bridgnorth [E. C.].

## SOMERSETSHIRE, NORTH.—NS.

Bath (Cattle Trough) [T. R.] ; Kenn [B.M. 1911. 10. 26 : 7794-7803] ; Kenn Moor [B.M. 1911. 10. 26 : 7752-61] ; Portishead Moor [B.M. 1911. 10. 26 : 7710-29].

## SOMERSETSHIRE, SOUTH.—SS.

Minehead [C. O.].

## STAFFORDSHIRE.—ST.

Cannock Chase [H. O.] ; Stoke-on-Trent [C. O.] ; Wightwick, Wolverhampton (Canal) [H. O.] ; Willenhall [H. O.].

## SURREY.—SR.

Addington [A. S. K.] ; Chertsey Mead [B. B. W.] ; Croydon [A. S. K.] ; Farley [A. S. K.] ; Waddon (R. Wandle) [B. B. W.] [B.M. 1901-2-25. 11-30].

## SUSSEX, EAST.—EX.

Bayham [A. S. K.].

## SUSSEX, WEST.—WX.

Boxgrove [A. W. S.].

## WARWICKSHIRE.—WW.

Sutton Coldfield district [H. O.].

## WESTMORLAND.—WL.

Ambleside [B.M. 1911. 10. 26 : 7564-78].

## WILTSHIRE, SOUTH.—SW.

Salisbury [B. B. W.].

## YORKSHIRE, NORTH-WEST.—NY.

Cundall [C. S.] ; Ripon [J. E. C.].

## YORKSHIRE, MID-WEST.—MY.

Ripon [J. E. C.].

## YORKSHIRE, NORTH-EAST.—EY.

Cundall [C. S.] ; Scarborough [Camb.] [B. B. W.] [B.M. 50-10-7 : 98-106].

## YORKSHIRE, SOUTH-WEST.—WY.

Halifax [A. S. K.] ; Huddersfield [B. B. W.] ; Penistone [C. O.].

## ISLE OF WIGHT.—IW.

Sandown [H. C. N.].

## WALES.

## ANGLESEY.—A.

Aberffraw [J. E. C.] ; Benllech [J. E. C.] ; Cemmaes [C. O.] ; Gaerwen [J. E. C.] ; Llanflewin [C. O.] ; Llan-gefni [J. E. C.] ; Pentraeth [J. E. C.] ; Red Wharfe Bay [J. E. C.] ; Rhos Goch [C. O.] ; Rhosneigr [C. O.] [J. E. C.].

**CARDIGANSHIRE.—CD.**

Llyfrant Valley [J. E. C.].

**CARMARTHENSHIRE.—CM.**

Pendine [W. M. W.].

**CARNARVONSHIRE.—CR.**

Abersoch [C. O.]; Llanberis [J. E. C.]; Llyn Bochlwyd (1000') [C. O.]; Llyn Cwm-ffynnon (1254') [C. O.]; Llyn Idwd (1200') [C. O.].

**MERIONETHSHIRE.—MN.**

Aberdovey [J. E. C.]; Arthog (600') [J. E. C.]; Cairn-March-Arthur (500') [J. E. C.]; Dovey Marshes [J. E. C.]; Gwernen Lake [J. E. C.]; Happy Valley [J. E. C.]; Trefi (500') [J. E. C.].

**MONTGOMERYSHIRE.—MG.**

Machynlleth [J. E. C.].

**PEMBROKESHIRE.—PB.**

Tenby [C. S.] [H. O.] [B.M. 98.6.16 : 43-58].

**CHANNEL ISLANDS.—CI.**

Guernsey [J. E. C.].

**SCOTLAND.****ABERDEENSHIRE, NORTH & SOUTH.—AN. & AS.**

Aberdeen [B.M. 1912. 12. 5 : 62-66]; Banchory (R. Dee) [Maj. Connolly].

**BUTE, ARRAN, &c.—B.**

Fad, L., Bute [A. W. S.]; Uriel Loch (1300') Arran [K. H. J.].

**DUMFRIES.—DF.**

Lochmaben [A. S. K.].

**ISLAY, &c.—I.**

Colonsay (L. Fad) [K. H. J.].

**KIRKCUDBRIGHTSHIRE.—KB.**

Creetown [E. C.].

**SKYE.—S. [A. W. S.].****SUTHERLANDSHIRE, NORTH.—NS.**

Hacoin, L., near Tongue [F. F. L.].

**SUTHERLANDSHIRE, SOUTH.—SS.**

Brora [C. S.].

**WIGTONSHIRE.—WT.**

Whithorn [E. C.].

**IRELAND.****ANTRIM.—AN.**

Antrim (Six-Mile-Water) [J. N. M.]; Fair Head [J. N. M.]; Glenshesk, R. [D. M.]; Greencastle [J. N. M.]; Kilcorrig [J. N. M.]; Lagan (Canal 2nd lock) [J. N. M.]; Neagh, L., & Glenavy, R. [D. M.].

**CARLOW.—CW.**

Tinnahinch [R. A. P.].

**CLARE.—CL.**

Aran Is. [D. M.]; Ballyvaughan [D. M.]; Cratloe Lakes [R. A. P.]; Porteen, L. [F. T.].

**CORK, MID.—MC.**

Cork Park [A. S. K.].

**CORK, WEST.—WC.**

Glengariff; More, L. [K. H. J.]; Schull [R. A. P.].

**DONEGAL, EAST—ED.**

Fad, L., Moville [D. M.] [J. N. M.]; Namin, L. [J. N. M.].

**DONEGAL, WEST.—WD.**

Tory, I. [A. W. S.].

**DOWN.—LO.**

Annandale [J. N. M.]; Comber [J. N. M.]; Deer's Meadow, Mourne Mts., near the Bann [D. M.]; Lagan (Canal 2nd lock) [J. N. M.]; Newry (Moor Quarry) [D. M.]; Newtownards [J. N. M.]; Portavoe [D. M.].

**DUBLIN.—DU.**

Lambay, I. [A. W. S.]; Rathfarnham [B.M. 1911.10.26 : 7855-60].

**FERMANAGH.—FE.**

Anlaban, L. [H. T.]; Nafeola, L. [H. T.]; Nawalskey, L. [H. T.]; Shean North, L. [H. T.]; Tully Lough [H. T.]; Tullylough More [H. T.]; Tullyvogy, L. [H. T.].

**GALWAY, SOUTH.—SG.**

Ballinasloe [R. A. P.]; Loughrea [R. A. P.]; Rea, L. [R. A. P.]; Tallanafrankagh, L. [R. A. P.]; Woodford (L. Alee) [R. A. P.].

**GALWAY, WEST.—WG.**

Inishbofin [A. W. S.]; Oughterara [R. A. P.].

**KERRY, SOUTH.—SK.**

Cromaglaun [D. M.]; Dingle Promontory [A. W. S.].

**LONDONDERRY.—LD.**

Coolkeeragh [J. N. M.]; Culmore [D. M.] [J. N. M.]; Enagh, L. [J. N. M.]; Walworth Wood [J. N. M.].

**LOUTH.—LH.**

Ardee [J. N. M.].

**MAYO, WEST.—WM.**

Achill, I. [A. W. S.]; Clare, I. [A. W. S.]; Cullylea, L. (800'); Curraun Mt. [A. W. S.]; Dooaghtry, L. [A. W. S.]; Dougan, near Newport [A. W. S.]; Inishturk [A. W. S.]; S.W. Mayo [A. W. S.].

**MONAGHAN.—MO.**

Ross, L. [J. N. M.].

**QUEEN'S COUNTY.—QC.**

Nut Grove [D. M.]; Rathdowney [R. A. P.].

**SLIGO.—SL.**

Chiffney [D. M.]; Enniscrone [D. M.]; Moyview [D. M.]; ?Talt, L. [A. S. K.].

**TIPPERARY, NORTH.—NT.**

Cloughjordan [R. A. P.].

**TYRONE.—TY.**

Roughan, L. [J. N. M.].

**WEXFORD.—WX.**

Enniscorthy [R. A. P.]; Rosslare [R. A. P.]; Wexford [R. A. P.].

**FOSSIL.****HOLOCENE.****ENGLAND.****LONDON.—L.**

Albert Docks [B.M.—L. 6728]; Blackfriars [B.M.—L. 6744]; between Canning Town and Stratford [B.M.—L. 10047]; Chingford [A. S. K.]; Fulham (Betteridge Road) [B.M.—L. 6739 *pars*]; West India Docks [M. P. G.]; Westminster [B. B. M.] [A. S. K.] [B.M.—L. 7568 *pars*]; London County Council Hall, Westminster Bridge Road [A. S. K.]; Lea Valley [A. S. K.] [B.M.—L. 6750 *pars* & 10036].

**BERKSHIRE.—BK.**

Newbury [A. S. K. & B. B. W.] [B.M.—L. 13217]; Wallingford [A. S. K.].

**ESSEX, SOUTH.—SE.**

Dagenham [A. S. K.]; Ilford [A. S. K.].

**GLOUCESTERSHIRE, WEST.—GW.**

Westbury-on-Severn [A. S. K.].

**HUNTINGDONSHIRE.—HU.**

St. Ives [A. S. K.].

**KENT, WEST.—WK.**

Crossness [B.M.—L. 6721].

**MIDDLESEX.—MX.**

Ponder's End; Uxbridge [A. S. K.].

**SUFFOLK, EAST.—ES.**

Blythburgh [A. S. K.].

**SUFFOLK, WEST.—WS.**

Knettishall [A. S. K.].

**SURREY.—SR.**

Staines [A. S. K.].

**WILTSHIRE, SOUTH.—SW.**

Fisherton [B. B. W.].

**SCOTLAND.****EDINBURGH.—ED.**

Edinburgh (Gayfield) [M. P. G.].

**KINROSS & FIFE.—KF.**

Elie [A. S. K.].

**IRELAND.****CLARE.—CL.**

Inchiquin, L. [A. S. K.].

**FERMANAGH.—FE.**

Magheragera [A. S. K.].

**GALWAY, NORTH.—NG.**

Ballinasloe [R. S. P.]; Menlough [A. S. K.].

## KILDARE.—KD.

Ballybetagh [A. S. K.].

## LIMERICK.—LK.

? Cappagh [A. S. K.]; Limerick [A. S. K.].

## MEATH.—ME.

? Kells [A. S. K.].

## AGE DOUBTFUL.

## BUCKINGHAMSHIRE.—BX.

Princes Risborough [Prestwich Coll., B.M.—L. 23957].

## ESSEX, NORTH.—NE.

Copford [B.M. 14862 *pars* & L. 6679] [M. P. G.].

## NORFOLK, EAST.—EN.

Bacton [B.M. 16486–98].

## SUFFOLK, EAST.—ES.

Sproughton [Prestwich Coll., B.M.—L. 23980].

## WORCESTERSHIRE.—WO.

Defford [Prestwich Coll., B.M.—L. 23955].

## PLEISTOCENE.

## LONDON.—L.

Angel Rd., Tottenham (Glacial) [A. S. K.]; Hackney [B. B. W.]; N.E. London [B.M.—L. 5804 *pars*]; Shacklewell Lane [Prestwich Coll., B.M.—L. 23974]; Spring Gardens (Admiralty) [B.M.—L. 7634].

## BEDFORDSHIRE.—BD.

Biddenham [Prestwich Coll., B.M.—L. 23962]; Kempston [B.M.—L. 18612].

## CAMBRIDGESHIRE.—CB.

Barnwell [A. S. K.] [B.M.—L. 5769, 6337 & 14932] [M. P. G.]; Barrington [B.M.—L. 5712 *pars*] [A. S. K.].

## ESSEX, NORTH.—NE.

Clacton [A. S. K. & B. B. W.].

## ESSEX, SOUTH.—SE.

Grays [A. S. K. & B. B. W.] [M. P. G.]; Ilford [A. S. K.].

## HUNTINGDONSHIRE.—HU.

Woodston [C. E. Y. K.].

## KENT, WEST.—WK.

Crayford-Erith [A. S. K. & B. B. W.] [B.M.—L. 6691 *pars*, 18608 & 19664 *pars*]; Swanscombe [A. S. K. & B. B. W.].

## NORTHAMPTONSHIRE.—NO.

Overton Longville [Prestwich Coll., B.M.—L. 23968].

## SUFFOLK, EAST.—ES.

Hoxne [M. P. G.]; Stutton [A. S. K.].

## SUSSEX, WEST.—WX.

West Wittering [A. S. K.].

## WORCESTERSHIRE.—WO.

Birlingham, nr. Pershore [A. S. K.]; Bricklehampton, nr. Pershore [A. S. K.]; Crophorne [M. P. G.].

## CROMERIAN.

NORFOLK, EAST.—EN.

Sheringham [M. P. G.] ; West Runton [A. S. K.] [M. P. G.]

## PLIOCENE.

NORFOLK, EAST.—EN.

Bramerton Common [N. M.]

This is a very widely distributed species on the Continent and is met with from Iceland [F. H. Sikes Coll.] and Lappland [Odhner Coll.] to Sicily, and from France to Lake Baikal. From this last locality it has been received under several names including that of *P. dubium*, Lindholm (95, p. 85).

On the other hand authentic fossil records are at present scarce. It has been recorded from the Holocene of Denmark [Johansen (85, p. 9)] ; seen from the Pleistocene (Campinien) of Soignes, Belgium [Mus. Hist. Nat. Brussels] ; and mentioned as met with in the Pleistocene (Mosbacher Sand) of Mauer (near Heidelberg) [Geyer (69, p. 96)].

It is possible that the *P. capellinii*, Sacco (151, p. 437), from the Pliocene of Piedmont may be a flattened form of this species.

4. ***Pisidium nitidum*, Jenyns.**

[Pls. I, f. 9 ; III, f. 6 ; XIX.]

1832. *Pisidium nitidum*, nobis : Jenyns, Trans. Camb. Phil. Soc. iv, p. 304, pl. xx, f. 7 & 8.  
 1843. *Cyclas nitida*, Jenyns : Hanley, Cat. Rec. Bivalve Shells, p. 90.  
 1854. *Pisidium incertum*, Nob. : Normand, Coup d'œil Cyclades Nord, p. 6. [Quotes Jenyns sp. & fig. as synonym !]  
 — *Pisum nitidum*, Jenyns : Deshayes, Cat. Conch. Brit. Mus. ii, p. 277.  
 1858. *Musculium nitidum*, Jenyns : Adams, Gen. Rec. Moll. ii, p. 451.  
 1859. ? *Pisidium pusillum*, var. *obtusalis* : Jeffreys, Ann. & Mag. Nat. Hist. III, iii, p. 37 : id., Brit. Conch. i, 1862, p. 24.  
 1873. ? *Pisidium pileus*, n. sp. : Clessin, Correspond.-Bl. zool.-min. Ver. Regensburg, xxvii, p. 150.  
 — *Pisidium fossarinum*, B. *acuminatum*, Clessin : Clessin in Westerlund, Fauna Moll. Sveciae, p. 545. [*Cf.* specimens in Norman Coll., B.M. 98. 5. 26 : 22253-54.]  
 1874. *Pisidium sphæriiforme*, n. sp. : Clessin in Fedchenko, Izvyest. imp. Obshchest. Lyubit. Estestvoz. Antrop. i Etnogr. Moskva, xi, vyp. 1, p. 38, pl. iii, f. 33.  
 1909. *Pisidium granum*, n. sp. : Lindholm in Korotneff, Wissensch. Ergebni. Zool. Exped. Baikal-See, iv, p. 87.

This is a somewhat polymorphic form and its extreme variations have been frequently mistaken for small *P. casertanum*, *P. personatum* or *P. pusillum*.

Jenyns, who was the first to separate it as a species, thus describes it (83, p. 304) :—

"P. testâ orbiculato-ovali, nitidissimâ, tenuiter striatâ; umbonibus obtusiusculis, striis paucis profundioribus.

"*Testa* minimè variabilis, orbiculato-ovalis, parùm inæquilateralis; præcedenti [*P. pusillum*] paulò convexior, et pro ratione longitudinis altior; albo lutescens, nitidissima, raro aut nunquam sorde aut rubigine obtecta, tenuiter striata, striis hic illic, præcipue 3-5 umbones transeuntibus, distinctius incisis: umbones obtusiusculi, dorsalem marginem paulò superantes."

The hinge-characters are as follows:—

*Hinge* (Pl. I, f. 9; III, f. 6) a little more than  $\frac{3}{4}$  the length of the shell, strong, fairly wide, projecting well inwards, arcuate with slight anterior flexure.

R.V. *a. I.* about  $\frac{1}{3}$  the length of the hinge-line, narrow, strong, bowed and inclined inwards; *base* very strong and swollen; *apex* central, fairly prominent, pointed obtuse; *ridges* fairly rounded, sloping fairly equally, steeply at first, then gradually.

*a. III.* about  $\frac{1}{5}$  the length of *a. I.*, the whole forming a narrow, arched prominence, somewhat apposed to the shell-margin.

*3.* strong, very prominent, crenulate top, sharply flexed; *a* narrow, approximately parallel to the shell-margin; *b* thicker, strongly sulcate, diagonally directed across the hinge-plate to near its inner margin.

*p. I.* about  $\frac{1}{4}$  the length of the hinge-line, narrow, strong, curving somewhat with the hinge-margin, erect; *base* strong, somewhat swollen; *apex* distal side of centre, not very prominent, obtuse-pointed; *ridges* sharp, sloping almost equally and fairly steeply.

*p. III.* about  $\frac{1}{2}$  the length of, and parallel to *p. I.*, narrow, erect; *apex* central, prominent, obtuse-pointed; *ridges* compressed, sloping about equally.

L.V. *a. II.* about  $\frac{1}{3}$  the length of the hinge-line, narrow, strong, nearly straight; *base* strong and slightly swollen; *apex* central, very prominent, acuminate; *ridges* fairly sharp, distal at first exceedingly steep, then nearly horizontal, umbonal sloping very steeply and descending to below the level of the distal.

*2.* very prominent, obtusely triangular, fairly parallel with the inner margin of the hinge-plate, base continuous with that of *a. II.*, pointed apex directed slightly backwards.

*4* very prominent, thin, sharp, flat-topped, at first fairly parallel to the shell-margin, then curving backwards round 2, and almost reaching the inner margin of the hinge-plate.

*p. II.* about  $\frac{1}{4}$  the length of the hinge-line, narrow, strong, erect, straight; *base* strong, scarcely swollen; *apex*

near distal end, very prominent, and distally directed; ridges slightly rounded, umbonal descending fairly rapidly, with slight convexity, distal exceedingly steep.

*Dimensions.*—As given by Jenyns, translated into millimetres: Long. 3·5, Alt. 3, Crass. 2 mm. A specimen from Mottram St. Andrews (Cheshire) in Mr. Oldham's Collection attains  $4 \times 3\cdot4 \times 2\cdot2$ , whilst another in the same collection from Dunster (Somerset) is  $3\cdot4 \times 3 \times 2\cdot3$ .

Jenyns laid particular emphasis on the 3–5 deep cut striae surrounding the neionic shell, which he states were more or less obvious in every specimen he had seen. These striae are certainly often a feature in the species but cannot be held characteristic of it since they are far from uncommon in *P. pusillum*, in which, however, they are both coarser and placed wider apart.\*

The specimens sent by Jenyns to Hanley, which are in the British Museum collection (1907.12.30 : 519–519) are thinner than the typical form.

Its nearest ally is *P. personatum*, from which it may be distinguished by its usually less rounded form, by the absence of the peculiar callus in the hinge characterizing that species, by the greater flexure of the cardinal (3) of the right valve, and the more oblique set of the cardinals 2 and 4 of the left valve.

From small forms of *P. casertanum*, it can be separated by the extreme anterior projection of the valves lying nearer to a line drawn through the adductor scars, and by its somewhat more regular striation; while the hinge is not so pronouncedly flexed, the apices of the lateral teeth of the right valve are nearer the umbones, the cardinal teeth of the left valve are more parallel to the hinge-line and 4 is not twisted.

Contrasted with *P. pusillum* it is less equilateral, the umbones are generally less prominent and the anterior dorsal margin usually slopes more sharply away from the umbo; the hinge-plate is broader, especially under the umbo, and more flexed; the apices of the lateral teeth are nearer to the umbo, and the outer laterals (*a. III.* & *p. III.*) of the right valve are proportionately much shorter; the cardinal 3 is flexed instead of nearly straight; in the left valve the cardinals are stronger and not so parallel to the hinge-line.

The specimen figured (Pl. XIX, f. 11) from Lough Fern, Co. Donegal, may be taken as an example of the typical form.

Several similar ones may be noted among the fossil forms (Pl. XIX, f. 25 *a*, *b*; 31 *a*, *b*; 34 *d*, *e*, *f*).

Very rounded individuals are shown from Swinton, Lancashire (Pl. XIX, f. 1 *a*, *b* & 17 *a*, *b*), from Lochmaben, Dumfriesshire

\* This feature misled Jeffreys, for a set of *P. pusillum* in the Norman Collection at the British Museum marked "*P. nitidum* examined by Jeffreys" [1911. 10. 26 : 7826–45] exhibits this feature, and in other respects also tallies closely with Jeffreys' description of *P. nitidum* in his "British Conchology."

(Pl. XIX, f. 15 a) and from Bohemia (Pl. XIX, f. 12 a). Both the last two instances occur in association with an oval form (Pl. XIX, f. 15 b & 12 b) that outwardly resembles *P. pusillum*; as also do examples from Church Close, Mortehoe, Devon (Pl. XIX, f. 10).

An approach to *P. personatum* is seen in some specimens like those from Gt. Gaddesden, Herts (Pl. XIX, f. 14 & 37 a, b). Trigonal forms recalling *P. casertanum* in miniature are those from Louth, Lincolnshire (Pl. XIX, f. 25), Sutton Coldfield, Warwickshire (Pl. XIX, f. 29 a, b), and the fossil example from the Holocene of Newbury (Pl. XIX, f. 27).

The amount of inflation varies from the normal as represented in the Lough Fern specimens (Pl. XIX, f. 5) to the more tumid forms from Tenby (Pl. XIX, f. 4) or in the direction of compression to that from the Lea Valley (Pl. XIX, f. 7).

## DISTRIBUTION.

81

p 1

			NS	CA
	HB		SS	
		RW	RE	EL
	8	WI	EI	PN
		AM	PM	FF
	M	DN	SG	PC
	I	B		KF
	CT		RF	LL
			<u>ED</u>	HD
			AY	LA
			PE	BW
			NN	
WD	ED	LD	AN	WT
	FE	TY	AR	KB
			<u>DO</u>	DF
WM	SL	LE	MO	SK
	EM	RO	CV	RX
		LH		SN
WG	<u>NG</u>	LF	WH	CU
	SG	KC	KD	WL
			DU	NY
CL	NT	QC	CW	DM
NK	LK	ST	KK	ML
			WX	MY
SK	MC	EC	WA	EY
WC				
		A		
		CR	DB	FT
			CH	DY
			NM	LS
		MN	MG	SP
			ST	LR
			<u>CB</u>	WN
		CD	RA	HII
			HF	<u>WS</u>
		WO	WW	ES
PB	CM	BR	GE	<u>NE</u>
			<u>OX</u>	BX
			BD	<u>HT</u>
GM	MM	<u>GW</u>	NW	SE
			BK	<u>SE</u>
L		NS	<u>SW</u>	WK
		ND	SH	<u>WK</u>
		SS	DT	EX
EC	SD		IW	
SC	WC			

51

*Pisidium nitidum*

(Recent occurrences are shown in red; fossil occurrences by a line below the symbols. For the explanation of the symbols see p. 20.)

**RECENT.****ENGLAND.****LONDON.—L.**

Hampstead [J. E. C.]

**BERKSHIRE.—BK.**

Old Windsor [J. E. C.]

**BUCKINGHAMSHIRE.—BX.**

Eton (R. Thames) [J. E. C.]; Iver [J. E. C.]; Weston Turville [J. E. C.]

**CHESHIRE.—CH.**

Bickley [C. O.]; Birkenhead [E. R. S.]; Budworth [A. S. K.]; Knutsford [C. O.]; Mottram St. Andrew [C. O.]; Mouldsworth [J. E. C.]

**CORNWALL.—EC. & WC.**

Truro [B. B. W.]

**CUMBERLAND.—CU.**

Allonby [W. J. F.]; Bassenthwaite [W. J. F.]

**DEVONSHIRE, NORTH.—ND.**

Morthoe district [J. L.]

**DEVONSHIRE, SOUTH.—SD.**

Newton Abbot district [B. B. W.]

**DURHAM.—DM.**

Cockerton (Darlington) [C. O.]

**HAMPSHIRE, SOUTH.—SH.**

Hoe Moor [J. E. C.]

**HERTFORDSHIRE.—HT.**

Gt. Gaddesden [C. O.]; Lea River [W. M. W.]

**KENT, EAST.—EK.**

Sissinghurst [A. S. K.]

**KENT, WEST.—WK.**

Keston [A. S. K.]

**LANCASHIRE, SOUTH.—SL.**

Southport [E. R. S.]

**LEICESTERSHIRE.—LR.**

Glenfield [C. O.]

**LINCOLNSHIRE, NORTH.—LN.**

Caistor (Croxby Pond) [C. S. S.]; Linwode [C. S. C.]; Louth (Burwell Wood) [C. S. C.]; South Kelsey [C. S. C.]; Tathwell [C. S. C.]; Tetney [C. S. C.]

**MIDDLESEX.—MX.**

Colnbrook [J. E. C.]; Edgeware [J. E. C.]; Enfield [J. E. C.]; Stanmore [J. E. C.]; Uxbridge [J. E. C.]; West Drayton [J. E. C.]

**NORFOLK, WEST.—WN.**

Castle Rising [J. E. C.]

**OXFORDSHIRE.—OX.**

Long Handborough [H. C. N.]

**SOMERSETSHIRE, NORTH.—NS.**

Portishead Moor & Kenn Moor [B.M. 53.12.6 : 22-31 & 1911.10.26 : 7804-09]; Walton Moor [B.M. 53.12.6 : 32-41 & 1911.10.26 : 7738-41].

**SOMERSETSHIRE, SOUTH.—SS.**

Dunster [C. O.].

**STAFFORDSHIRE.—ST.**

Cannock Chase [H. O.]; Wolverhampton (Canal) [H. O.].

**SUFFOLK, EAST.—ES.**

Blythburgh [A. S. K.]; Mendlesham [A. M.]; Walberswick [J. E. C.].

**SUFFOLK, WEST.—WS.**

Mildenhall [A. M.]; Wetherden [A. M.].

**SURREY.—SR.**

Chertsey Mead [B. B. W.].

**SUSSEX, EAST.—EX.**

Bayham [A. S. K.]; Pevensey Level [A. W. S.].

**WARWICKSHIRE.—WW.**

Sutton Coldfield district [H. O.].

**YORKSHIRE, SOUTH-WEST.—WY.**

Halifax [A. S. K.].

**ISLE OF MAN.—IM.**

Near Ballaugh [F. T.].

**ISLE OF WIGHT.—IW.**

Sandown [H. C. N.].

**WALES.****PEMBROKESHIRE.—PB.**

Tenby [W. M. W.] [J. E. C.] [H. C. N.].

**SCOTLAND,****DUMFRIES.—DF.**

Lochmaben [A. S. K.].

**HADDINGTONSHIRE.—HD.**

Luffness Links [C. S.].

**SELKIRK.—SK.**

Meigle Moss [A. S. K.].

**WIGTONSHIRE.—WT.**

Whithorn [E. C.].

**IRELAND.****ANTRIM.—AN.**

Belvoir Park, Belfast [D. M.]; Dhu, L., Sallagh Braes (1100 feet) [A. W. S.]; Kilcorrig [J. N. M.]; Lagan [J. N. M.]; Neagh, L. [J. W. J.].

**CLARE.—CL.**

Cratloe Lakes [R. A. P.]; Inishmore (Aran Is.) [R. A. P.]; Porteen, L. [F. T.].

**CORK, MID.—MC.**

Cork Park [R. A. P.] [A. S. K.]; Inniscarra [R. A. P.].  
**CORK, WEST.—WC.**

Avanl, L. [K. H. J.]; Clear, I. [R. A. P.].

**DONEGAL, EAST.—ED.**

? Bundoran [D. M.]; Craigs [D. M.]; ? Letterkenny [D. M.]; Tullynacross [H. T.]; Vearty, L. [H. T.].

**DONEGAL, WEST.—WD.**

Adeery, L. [H. T.]; Fern, L. [J. N. M.]; Melmore, L. [A. W. S.]; ? Letterkenny [D. M.].

**DOWN.—DO.**

Avoniel [D. M.]; Lagan [J. N. M.].

**DUBLIN.—DU.**

Milltown [R. A. P.]; Rathfarnham [B.M. 1911.10.26: 7861-62].

**FERMANAGH.—FE.**

Glencreawan, L. [H. T.]; Tempo [D. M.]; Tullylough More [H. T.]; Vearty, L. [H. T.].

**GALWAY, SOUTH.—SG.**

Oranmore [R. A. P.]; Rea, L. [R. A. B.]; Tallanafrankagh, L. [R. A. P.].

**GALWAY, WEST.—WG.**

Inishbofin [A. W. S.]; Oughterard [R. A. P.].

**KERRY, SOUTH.—SK.**

Dingle Promontory [A. W. S.].

**LEITRIM.—LE.**

? Bundroes [D. M.].

**LIMERICK.—LK.**

Dromore [R. A. P.].

**LONDONDERRY.—LD.**

Coolkeeragh [D. M.] [J. N. M.]; Enagh, L. [J. N. M.]; Rosser Bay [D. M.]; Walworth Wood [J. N. M.].

**LOUTH.—LH.**

Ardee [J. N. M.].

**MAYO, WEST.—WM.**

Achill, I. [A. W. S.]; Clare, I. [A. W. S.]; Dooaghtry, L. [A. W. S.]; Inishturk [A. W. S.]; Louisburgh district [A. W. S.].

**MONAGHAN.—MO.**

Glaslough [D. M.].

**QUEEN'S COUNTY.—QC.**

Rathdowney [R. A. P.].

**ROSCOMMON.—RO.**

Bushey Park [D. M.]; Woote Park [D. M.].

**SLIGO.—SL.**

Talt, L. [A. S. K.].

**TIPPERARY, NORTH.—NT.**

Finnoe [D. M.].

**WEXFORD.—WX.**

Enniseorthy [R. A. P.]; Rosslare [R. A. P.].

## FOSSIL.

## HOLOCENE.

LONDON.—**L.**

Between Canning Town & Stratford [B.M.—L. 10046 *pars*] ; Chingford [A. S. K.] ; New Scotland Yard [B. B. W.] ; London Wall [A. S. K.] ; Shand Street [A. S. K.] ; London County Council Hall, Westminster Bridge Road [A. S. K.] ; Lea Valley [A. S. K.] [B. B. W.] [B.M.—L. 6736-7 & 6750] ; Westminster [B. B. W.] .

BERKSHIRE.—**BK.**

Newbury [A. S. K.] [B.M.—L. 13217 *pars*] ; Wallingford (Bed A) [A. S. K.] .

BUCKINGHAMSHIRE.—**BX.**

Boveney [J. E. C.] .

ESSEX, NORTH.—**NE.**

Roxwell [B.M.—L. 7638] .

MIDDLESEX.—**MX.**

Ponder's End [A. S. K.] .

GLOUCESTERSHIRE, WEST.—**GW.**

Westbury-on-Severn [A. S. K.] .

HUNTINGDONSHIRE.—**HU.**

St. Ives [A. S. K.] .

LANCASHIRE, MID.—**ML.**

Hawes Water, Silverdale [J. W. J.] .

OXFORDSHIRE.—**OX.**

Clifton-Hampden (Bed B) [A. S. K.] .

SUFFOLK, EAST.—**ES.**

Blythburgh [A. S. K.] .

SUFFOLK, WEST.—**WS.**

Knettishall [A. S. K.] .

SURREY.—**SR.**

Near Staines [A. S. K.] .

## SCOTLAND.

EDINBURGH.—**ED.**

Edinburgh (Gayfield) [M. P. G.] .

## IRELAND.

CLARE.—**CL.**

? Ballyalla, L. [A. S. K.] ; ? Corofin [A. S. K.] ; Inchiquin, L. [A. S. K.] .

DOWN.—**LO.**

Hillsborough [A. W. S.] .

FERMANAGH.—**FE.**

Magheragera [A. S. K.] .

GALWAY, NORTH.—**NG.**

Clonbrock [A. S. K.] [D. M.] ; Menlough [A. S. K.] .

GALWAY, SOUTH.—**SG.**

Ballinasloe [R. A. P.] .

KILDARE.—**KD.**

Ballybetagh [A. S. K.] .

## KING'S COUNTY.—KC.

Lusmagh [A. S. K.]

## LIMERICK.—LK.

Bliach, L. [A. S. K.]; Rathurd [A. S. K.]

## AGE DOUBTFUL.

## ESSEX, NORTH.—NE.

Copford [B. B. W.]

## PLEISTOCENE.

## LONDON.—L.

Angel Rd., Tottenham (Glacial) [A. S. K.]

## BEDFORDSHIRE.—BD.

Biddenham [Prestwich Coll., B.M.—L. 23963].

## CAMBRIDGESHIRE.—CB.

Barnwell [A. S. K. &amp; B. B. W.] [? B.M.—L. 5709, 14931];

Barrington [A. S. K.]

## ESSEX, SOUTH.—SE.

Ilford [A. S. K.]

## HERTFORDSHIRE.—HT.

Hitchin [M. P. G. 25707].

## KENT, WEST.—WK.

Crayford &amp; Erith [A. S. K. &amp; B. B. W.]; Swanscombe [A. S. K. &amp; B. B. W.]

## MIDDLESEX.—MX.

Ponder's End (Glacial) [A. S. K.]

## NORTHAMPTONSHIRE.—NO.

Overton Longville [Prestwich Coll., B.M.—L. 23969].

## SUFFOLK, EAST.—ES.

Hoxne [M. P. G. 6048]; Stutton [A. S. K.]

## SUSSEX, WEST.—WX.

West Wittering [A. S. K.]

## WILTSHIRE, SOUTH.—SW.

Fisherton [B.M.—L. 6715].

## WORCESTERSHIRE.—WO.

Bricklehampton, near Pershore [A. S. K.]

## CROMERIAN.

## NORFOLK, EAST.—EN.

West Runton [A. S. K.] [N. M.]

On the Continent this species ranges from Scandinavia [Lynge Coll.] to Naples [Bellini Coll.], and from France through Transylvania [Norman Coll., B.M. 98. 5. 20: 22378-84 & 22444-55 pars] and Russia [Lindholm Coll.] to Lake Baikal, whence it has been described as *P. granum*, Lindholm (95, p. 87).

The sole reliable records of it in a fossil condition are from the Holocene of Denmark [Johansen (95, p. 9)] and the Sands at St. Acheul, France [Prestwich Coll., B.M.—L. 14877].

### 5. **Pisidium personatum**, Malm.

[Pls. I, f. 7; III, f. 5; XX.]

1855. *Pisidium personatum*, n. sp.: Malm, Götheborgs K. Vet. & Vitt. Samh. Handl., Hft. iii, p. 107, figs.
1856. ? *Pisidium nitidum*, var. *splendens* (Baudon MS.): Moquin-Tandon, Hist. Nat. Moll. France, ii, p. 586; Baudon, Mém. Soc. Acad. Oise, Beauvais, iii, 1857, pp. 335 & 337, pl. i, figs. B.B. [Cf. specimens in Norman Coll., B.M. 98. 5. 20; 22246-49.]
- 1874 *Pisidium fossarinum*, var. *curtum*: Clessin in Küster, Syst. Conch.-Cab., ix, abth. 3, Cycladeen, p. 34. [Cf. specimens in Norman Coll., B.M. 98. 5. 20: 22259-60.]
1890. *Pisidium fontinale*, var. *curtum*, Cless.: Westerlund, Fauna palæarct. Region, vii, p. 26.
- *Pisidium obtusale*, var. *personatum*, Malm: id., tom. cit., p. 35.
1893. *Pisidium clessini*, n. sp. [pars]: Surbeck, Rev. Suisse Zool. vi, p. 482, pl. xii, f. 6-15.

The detection in 1908 (191, p. 124) of this somewhat variable species in the British Isles has done much to clarify the conception of several others, such as *P. casertanum*, *P. nitidum*, and *P. pusillum*, with which it had generally been mixed.

Malm's diagnosis (106, p. 107) is:—

"C. orbiculato-ovalis, compressiuscula, tenuissime striata, sulcisque 1-5 concentricis prædita, nitidissima; lutescens, margine excepto, lutescenti-cinerea, sed sorde ferruginea omnino obiecta; natibus convexis, umbonibus sub prominulis. Siphon per brevis, validus et ad extremitatem valde constrictus."

To this may now be appended the following details concerning the hinge:—

*Hinge* (Pl. I, f. 7; III, f. 5) about  $\frac{7}{8}$  the length of the shell, wide, projecting well inwards, very strong, arcuate, with double flexure in right valve.

- R.V. *a. I.* a little more than  $\frac{1}{3}$  the length of the hinge-line, very stout and strong, curving inwards; *base* very strong and swollen; *apex* on distal side of centre, prominent, somewhat distally directed, pointed obtuse; *ridges* rounded, distal descending very steeply at first, then gradually, umbonal sloping somewhat less steeply and descending to a lower level.
- a. III.* nearly  $\frac{3}{8}$  the length of *a. I.*, narrow, strong, apposed to the shell-margin; *apex* distal side of centre, prominent, blunt obtuse; *ridges* rounded and sloping about equally.
3. lamelliform, very prominent, lying close to the shell-margin, slightly arcuate and somewhat outwardly inclined, top crenulate and highest in the centre.

*p. I.* about  $\frac{1}{3}$  the length of the hinge-line, stout, strong, slightly curving inwards; *base* strong and swollen; *apex* toward the distal end, prominent, rounded obtuse; *ridges* rounded, umbonal descending fairly steeply, distal very steeply.

*p. III.* about  $\frac{1}{3}$  the length of *p. I.*, stout, strong, lying close to and curving with the shell-margin; *apex* distal side of centre, not very prominent, rounded obtuse; *ridges* rounded and sloping fairly equally and gradually.

*Callus*: between the umbonal end of *p. III.* and the ligament pit an irregular shaped, more or less prominent, shelly mass or callus, is almost always present.

*L.V. a. II.* about  $\frac{3}{8}$  the length of the hinge-line, fairly stout, strong, straight; *base* very strong and swollen; *apex* central, exceedingly prominent, rounded acuminate; *ridges* fairly sharp, sloping about equally and very steeply, the umbonal descending to a lower level than the distal.

2. very prominent, obtusely triangular, apex directed backwards towards the umbo, base continuous with that of *a. II.*

4. lamelliform, sharp, not very prominent, anterior portion immediately above 2, close to and parallel with the shell-margin, posterior portion curving to about half-way across the hinge-plate.

*p. II.* about  $\frac{1}{3}$  the length of the hinge-line, fairly stout, strong, curving with the shell-margin; *base* very strong; *apex* on distal side of centre, very prominent, rounded acuminate; *ridges* fairly sharp, umbonal ridge descending fairly steeply at first, then gradually.

*Callus*: a rounded swelling at the umbonal extremity of *p. II.* next the ligament-pit.

*Dimensions*.—From Scotforth (Lancs.), coll. C. Oldham: Long. 4·75, Alt. 4, Crass. 3 mm.; from Barnes (Surrey), 3·6 × 3·2 × 2·4 mm.

Typical specimens are less inequilateral than most of the genus and in this the species compares with *P. pusillum* and the smaller individuals of the lake-form of *P. casertanum*. When clean the umbonal regions have a dull silky, or satiny sheen.

From its nearest ally *P. nitidum* it differs in attaining a larger size and having a rounder outline, all the teeth are more outwardly directed; in the right valve the anterior lateral *a. III.* is much more closely apposed to the shell-margin, the cardinal 3 is nearly straight instead of sharply flexed; whilst in the left valve the apex of the posterior lateral (*p. II.*) is nearer the umbo, and the outer cardinal (4) is, save for its extreme posterior end, parallel to the shell-margin.

From *P. pusillum* it differs in having a heavier hinge, in which the lateral teeth *a. III.* and *p. III.* are proportionately much shorter,

whilst the cardinal teeth in both valves are not so sharp and straight.

From *P. casertanum*, even small, lake forms, it is distinguished by its more globose form, its straighter cardinals, which are more strictly parallel with the hinge-line; and by the proportionately larger anterior lateral, *a. III.*, which lies against the shell-wall instead of standing out by itself.

Above all it is usually immediately separable from all by the hall-mark of the species, the peculiar callus that lies in either valve between the umbonal ends of the posterior lateral teeth and the ligament-pit.

As typical forms we would select those from Fitton Hall, Oldham (Pl. XX, f. 1), Bassenthwaite (Pl. XX, f. 2 & 20 *a, b*) and from the Holocene of the Kennet Valley (Pl. XX, f. 26 *e & g*). Extremely oval forms are met with from Lough Fern, Co. Donegal (Pl. XX, f. 3 *d* & 33 *a, b*) and from the Holocene of the Kennet Valley (Pl. XX, f. 26 *h*).

Forms that approach the lake-form of *P. casertanum* in external shape are shown from Lancaster (Pl. XX, f. 16) and Fair Head, Co. Antrim (Pl. XX, f. 17). As an example of the normal inflation of the species may be taken that of a specimen from Barnes Common (Pl. XX, f. 4); whilst Lancaster yields a flattened example (Pl. XX, f. 5), and on the other hand extreme inflation is exhibited by specimens from Colchester (Pl. XX, f. 7) and Ziegenhals, Silesia (Pl. XX, f. 8).

## DISTRIBUTION.

### RECENT.

#### ENGLAND.<sup>1</sup>

##### LONDON.—**L.**

Barnes Common [B. B. W.] [W. M. W.]; Hampstead [J. E. C.]; Putney [W. M. W.]; Tottenham (R. Lea) [W. M. W.].

##### CHESTER.—**CH.**

Baguley [C. O.]; Bramhall [C. H. M.]; Mobberley [C. O.]; Mouldsworth [A. S. K.]; Northenden [C. O.].

##### CUMBERLAND.—**CU.**

Bassenthwaite [W. J. F.]; Rockcliffe [J. L.].

##### DEVONSHIRE, NORTH.—**ND.**

Braunton [J. L.]; Croyde [J. L.]; Morthoe district [J. L.].

##### DURHAM.—**DM.**

Butterwick [B.M. 1911.10.26: 7949-61.]; Elwick [B.M. 1911.10.26: 7873-78].

##### ESSEX, NORTH.—**NE.**

Birch [W. M. W.]; Colchester (?), [W. M. W.]; West Bergholt [B.M. 47-11-19: 163-177].

##### ESSEX, SOUTH.—**SE.**

Warley [W. M. W.].

**Gloucestershire, West.—GW.**

Bristol [B. B. W.]

HAMPSHIRE, SOUTH.—SH

Fordingbridge [W. M. W.] ; Hambleton [W. M. W.] (as *nitidum*, var. *lateralis*) ; Hoe Moor [J. E. C.].

## HERTFORDSHIRE.—HT.

Watford [B.M. 1912. 12. 5 : 91-94].

81

01

	NS		CA	
HB	SS			
S	RW	RE	EL	BF AN
	WI	EI	PN	AS
M	AM	PM	FF	KI
	DN	SG	PC	<u>KF</u>
B	CT	RF	LL	<u>ED</u> ND
		AY	LA	PE BW NN
WD	ED	LD	AN	WT KB BF SK RX SN
FE	TY	AR	DS	CU WL NY DM
WM	SL	LE	MO	IM ML MY EY
EM	RO	CV	LH	SL WY SY LN
WG	<u>NG</u>	LF	WH ME	A CR DB FT CH DY NM LS
SG	KC	KD	DU	MN MG SP ST LR CB WN EN
CL	NT	QC	CW WI	ED RA HF WO WW NO HU WS ES
NK	LK	ST	KK WX	PB CM BR GE OX BX BD HT NE
SK	MC	EC	WA	GM MM <u>GW</u> NW BK MX SE
WC				NS SW NH SR WK EK
	L	ND	SS DT	SH WX EX
	EC	SD		IW
SC	WC			

C 1

*Pisidium personatum.*

(Recent occurrences are shown in red: fossil occurrences by a line below the symbols. For the explanation of the symbols see p. 20.)

ISLE OF WIGHT.—IW. [B.M. 1911.10.26 : 7775-93].

KENT, WEST.—WK.

Keston [A. S. K.]

LANCASHIRE, Mid.—ML.

Lancaster [A. S. K.]: Scotforth [C. O.]: Silverdale [A. S. K.]

**LANCASHIRE, SOUTN.—SL.**

Ashton-under-Lyne [C. O.]; Oldham [B. B. W.]; Southport [T. R.]; Swinton [C. O.] [A. S. K.].

**LEICESTERSHIRE.—LR.**

Aylestone [C. O.].

**LINCOLNSHIRE, NORTH.—LN.**

Louth (Burwell Wood) [C. S. C.]; Ruckland [C. S. C.]; Tathwell (Maltby Wood) [C. S. C.].

**NORFOLK, WEST.—WN.**

East Winch [B. B. W.].

**NORTHAMPTONSHIRE.—NO.**

Kettering (Hot water tank c. 70°) [C. E. W.].

**OXFORDSHIRE.—OX.**

Chiltons, near Shirburn [H. C. N.]; Oxford [H. C. N.]; Yarnton [H. C. N.].

**SOMERSETSHIRE, NORTH.—NS.**

Clevedon and Kenn Moor [B.M. 53.12.6: 42-52 *pars* & 1911.10.26: 7909-28].

**SURREY.—SR.**

Lingfield [W. M. W.].

**SUSSEX, EAST.—EX.**

Bayham [A. S. K.]; Lewes [C. O.].

**SUSSEX, WEST.—WX.**

Bognor [H. O.].

**WARWICKSHIRE.—WW.**

Ashfurlong [H. O.]; Sutton Coldfield [H. O.].

**WESTMORLAND.—WL.**

Ambleside [B.M. 1911.10.26: 7703].

**YORKSHIRE, MID-WEST.—MY.**

Beal [C. S.]; Bishopthorpe [B. B. W.]; York [W. M. W.] [B.M. 40.10.16: 143-148].

**YORKSHIRE, NORTH-EAST.—EY.**

York [W. M. W.] [B.M. 40.10.16: 143-148].

**YORKSHIRE, SOUTH-EAST.—SY.**

Bishopthorpe [B. B. W.]; Sigglesthorne Station [B. B. W.]; York [W. M. W.] [B.M. 40.10.16: 143-148].

**YORKSHIRE, SOUTH-WEST.—WY.**

Beal [C. S.]; Halifax [A. S. K.]; Huddersfield [B. B. W.].

**SCILLY Is.—SC.** [J. R. Le B. Tomlin.]**WALES.****ANGLESEY.—A.**

Cemmaes [C. O.]; Llyn Penryngwyelanod [C. O.].

**CARDIGANSHIRE.—CD.**

Llyfrant [J. E. C.].

**CARNARVONSHIRE.—CR.**

Bwlch Gwynt, near Nevin [H. C. N.].

## MERIONETHSHIRE.—MN.

Aberdovey [J. E. C.] ; Arthog [J. E. C.] .

## PEMBROKESHIRE.—PB.

Tenby [W. M. W.] [H. C. N.] .

## SCOTLAND.

## ABERDEENSHIRE, NORTH &amp; SOUTH.—AN. &amp; AS.

Aberdeen [B.M. 42-9-30 : 79-85].

## DUMFRIESSHIRE.—DF.

Lochmaben [A. S. K.] .

## HADDINGTONSHIRE.—HD.

Luffness Links [C. S.] .

## ISLAY, &amp;c.—I.

Colonsay [K. H. J.] .

## SELKIRKSHIRE.—SK.

Meigle Moss [A. S. K.] .

## SUTHERLANDSHIRE, SOUTH.—SS.

Brora [C. S.] .

## IRELAND.

## ANTRIM.—AN.

Antrim (Six-Mile-Water) [J. N. M.] ; Brown's Bay [D. M.] ;  
Fair Head [J. N. M.] ; Glenshesk [D. M.] ; Kenlane [D. M.] .

## CLARE.—CL.

? Inishmore (Aran Is.) [R. A. P.] .

## DONEGAL, EAST.—ED.

Meenaskeagh, L. [H. T.] .

## DONEGAL, WEST.—WD.

Fern, L. [J. N. M.] ; Melmore (Lough & Mt.) [A. W. S.] ;  
Salt, L. [A. W. S.] ; Tory, L. [A. W. S.] .

## DOWN.—DO.

Newcastle [D. M.] .

## DUBLIN.—DU.

Lambay [A. W. S.] ; Portmarnock [D. M.] .

## GALWAY, SOUTH.—SC.

Ballinasloe [R. A. P.] ; Loughrea [R. A. P.] ; Portumna [R. A. P.] ; Rea, L. [R. A. P.] .

## GALWAY, WEST.—WG.

Mac Dara's I. [D. M.] .

## KERRY, SOUTH.—SK.

Dingle Promontory [A. W. S.] .

## LIMERICK.—LK.

Ballinacurra [F. T.] .

## LONDONDERRY.—LD.

Enagh, L. [J. N. M.] [D. M.] ; Walworth Wood [J. N. M.] .

## MAYO, WEST.—WM.

Achill, I. [A. W. S.] ; Cahir, I. [A. W. S.] ; Clare, I. [A. W. S.] ;  
Gencullin [A. W. S.] ; Louisburgh District [A. W. S.] .

## WESTMEATH.—WH.

Mullingar [D. M.] .

## FOSSIL.

## HOLOCENE.

LONDON.—**L.**

Blackfriars [B.M.—L. 6743].

BERKSHIRE.—**BK.**

Newbury [A. S. K. & B. B. W.] [B.M.—L. 13217 *parts*].

ESSEX, NORTH.—**NE.**

Chignal St. James [A. S. K. & B. B. W.]; Felstead Farm [B. B. W.].

GLOUCESTERSHIRE, WEST.—**GW.**

Westbury-on-Severn [A. S. K.].

## SCOTLAND.

EDINBURGH.—**ED.**

Edinburgh (Corstorphine) [A. S. K.]; Edinburgh (Meadows) [B.M. 98005 *parts*].

KINROSS & FIFE.—**KF.**

Elie [A. S. K.].

## IRELAND.

GALWAY, NORTH.—**NG.**

Menlough [A. S. K.].

## AGE DOUBTFUL.

ESSEX, NORTH.—**NE.**

Copford [A. S. K. & B. B. W.] [B.M. 14863; L. 6678-79] [M. P. G.].

## PLEISTOCENE.

ESSEX, NORTH.—**NE.**

Clanton [A. S. K. & B. B. W.].

HUNTINGDONSHIRE.—**HU.**

Woodston [C. E. Y. K.].

This species is probably widely distributed abroad, though hitherto undetected. It occurs in Scandinavia [Lyngé Coll. & Norman Coll., B.M. 98.5.20: 22501-02], France and Germany [Norman Coll., B.M. 98.5.29: 22246-49; 22225-33 & 22259-60], Lake Lucerne [as *P. clessini*, Surbeck, *parts*, Surbeck Coll.], Italy and Sicily [Bellini Coll. & Coll. Marquess de Monterosato], as well as in Eubœa [Norman Coll., B.M. 98.5.20: 22274-76].

Fossil examples have been recognized from the Pleistocene of Stuttgart [Wüst Coll.].

6. **Pisidium pusillum** (Gmelin) Jenyns.

[Pls. I, f. 8; III, f. 4; XXI.]

1791. ? *Tellina pusilla*: Gmelin in Linné, Syst. Nat. 13th ed., i, p. 3231, no. 16.
1822. *Cyclas pusilla* [pars]: Turton, Conch. Brit. p. 251, pl. xi, f. 16 & 17; *id.*, Manual, 1831, p. 16, f. 7.
- *Cyclas fontinalis*, Lam.: Nilsson, Hist. Moll. Sveciae, p. 101. [*Fide* Malm, Götheborgs K. Vet. & Vitt. Samh. Handl. iii, 1855, p. 104.]
1831. *Cyclas gibba*, Leach MS.: Alder, Trans. Nat. Hist. Soc. Northumbld. i, p. 41. (*Cf. id. ii*, 1838, p. 341.)
1832. *Pisidium pusillum*, Gmel.: Jenyns, Trans. Camb. Phil. Soc. iv, p. 302, pl. xx, f. 4-6.
1852. ? *Euglesa henslowiana*, Leach, Moll. Brit. Synop. p. 291.
1854. *Pisum pusillum*, Gmel.: Deshayes, Cat. Conch. Brit. Mus. ii, p. 277.
1856. *Pisidium cazertanum*, var.  $\gamma$ . *thermale*: Moquin-Tandon, Hist. Nat. Moll. France, ii, p. 584.
1858. *Musculium pusillum*, Gmel.: Adams, Gen. Rec. Moll. ii, p. 452.
1871. *Pisidium milium*, var. *normandianum*, Dupuy: Clessin, Malakozool. Blätt. xvii, p. 194. [*Fide* specimens from Clessin in Lindholm Coll.]
1899. *Pisidium clessini*, n. sp. [pars]: Surbeck, Rev. Suisse Zool. vi, p. 482, pl. xii, f. 6-15.
1903. *Corneocyclas* (s.s.) *pusilla*, Gmel.: Dall, Proc. Biol. Soc. Washington, xvi, p. 7.
1908. *Pisidium tornense*, n. sp.: Olhner, Naturw. Untersuch. Sarekgebirges, iv, p. 154, pl. iii, f. 9-13.

What the *Tellina pusilla* of Gmelin really was will now never be known; he describes it (97, i. p. 3231) as:—

“*T. testa ovata ventricosa, tenui transverse striata, cardine in altera valva edentulo, in altera dente primario duplice.*”

He applies the name to a shell described in Schröter's “Geschichte der Flussconchylien” (160, p. 194) as “*Chama fluviatilis transversim striata subovata.*” The crude figure that accompanies this description (160, pl. iv, f. 7a & b) represents a very strongly-striate shell that might be *Pisidium pulchellum*, but the shape of which suggests a young *P. amnicum*. Lister, Turton and others applied the name to the smaller forms of the genus without adequate discrimination and cannot be quoted.

Jenyns, however, having adopted and applied the name to a well-defined form, his selection must be adhered to. His diagnosis (83, p. 303) is:—

“*Testa variabilis, plerumque orbiculato-ovalis, interdum suboblonga margine dorsali recto, vix inaequilateralis; praecedenti [P. obtusale] multo magis compressa, marginibus acutis; saepius extranea rubigine obiecta, quam remotâ, apparent*

striæ subtilissimæ, non nisi oculo armato conspiciendæ; in var.  $\gamma$  nitida, striis distinctis, profundius incisis; umbones subdepressi, parum prominuli, interdum subacuti."

This fairly sums up the external characters. The particulars of the hinge are as follows:—

*Hinge* (Pl. I, f. 8; III, f. 4) about  $\frac{3}{4}$  the length of the shell, narrow, especially so under the umbo, rather weak, strongly curved.

R.V. *a. I.* about  $\frac{1}{3}$  the length of the hinge-line, very narrow, fairly strong, nearly straight; *base* fairly strong, slightly swollen; *apex* near distal end, somewhat distally directed, not very prominent, very obtuse-pointed; *ridges* sharp, distal descending first steeply, then gradually, umbonal fairly gradually to a lower level than the distal.

*a. III.* about  $\frac{1}{2}$  the length of, and parallel to *a. I.*, a deep sulcus lying between the two, narrow, straight; *apex* about central, not very prominent, very obtuse-pointed; *ridges* sharp and sloping about equally and gradually.

*3.* lamelliform, sharp, not very prominent, faintly areuate, flat-topped, parallel with and close to the shell-margin, posterior end (*b*) slightly thickened.

*p. I.* about  $\frac{1}{3}$  the length of the hinge-line, narrow, fairly strong, curving with the shell-margin, slightly outwardly directed; *base* strong; *apex* near the distal end, not very prominent, very obtuse and rounded; *ridges* sharp, umbonal sloping gradually, distal somewhat more steeply.

*p. III.* about  $\frac{1}{2}$  the length of, and parallel to *p. I.*, a deep sulcus dividing the two, narrow, straight; *apex* about central, not very prominent, very obtuse and rounded, slightly outwardly inclined; *ridges* sharp, sloping about equally and gradually.

L.V. *a. II.* about  $\frac{1}{3}$  the length of the shell, very narrow, strong, straight; *base* strong and straight; *apex* near distal end; distally directed, very prominent, bluntly pointed; *ridges* sharp, distal ridge descending very steeply at first, then gradually, umbonal fairly steep, descending to a lower level than the distal.

*2.* lamelliform, rather sharp, prominent, parallel with hinge-margin, top very flatly rounded, with faint trace of backwardly directed apex, base continuous with that of *a. II.*

*4.* lamelliform, sharp, not very prominent, anterior portion parallel to *2*, posterior curving slightly towards inner hinge-margin.

*p. II.* about  $\frac{1}{3}$  the length of the hinge-line, very narrow, fairly strong, curving with the shell-margin, slightly

outwardly directed; *base* fairly strong;  *apex* near distal end, prominent, pointed, obtuse; *ridges* sharp, umbonal sloping gradually, distal very steeply.

*Dimensions.*—A specimen from Walworth Wood (Londonderry) from the collection of Mr. J. N. Milne measures : Long. 4, Alt. 3·4, Crass. 2·3 mm.; from Comber (Down) from the same collection is one  $4 \times 3\cdot2 \times 2\cdot2$  mm.

Jenyns distinguished two varieties:— $\beta$  in which the umbones were more prominent, and  $\gamma$  in which the striae were more pronounced; these, however, are quite immaterial distinctions in the light of present knowledge. His remark that “the shell is certainly somewhat intermediate in form between that of *Cyclas [Sphaerium]* and *Pisidium*” is very apt, the comparative great length of the laterals *a. III.* and *p. III.* as well as the shape recalling *Sphaerium*, and usually serving to separate it from the other species of *Pisidium*.

It may further be distinguished from *P. personatum*, which it frequently, and from *P. nitidum*, which it sometimes, closely resembles in external form, by the hinge-characters. The hinge-plate is not so broad, the teeth are more slender, and the cardinals straighter and more parallel to the hinge-line than in either of those species. It of course lacks the callus peculiar to *P. personatum*, and is more equivalve and oval than *P. nitidum*.

The periostracum in perishing or half-dead shells is usually iridescent, an appearance less commonly met with in other species, and in shell-marls the umbones are very often broken away. The transition from the neopionic to the adult shell is frequently, as in *P. nitidum*, marked by a series of closer set, strongly marked striae, which are, however, both coarser and more wide apart than in the latter species.

Of the numerous forms and variants figured, those from Tenby, Pembrokeshire (Pl. XXI, f. 13 & 33 *a, b*) are perhaps the most typical. The rounded form outwardly resembling *P. personatum* is represented from Rhosneigr, Anglesey (Pl. XXI, f. 19), and from the Botanic Gardens at Naples (Pl. XXI, f. 29 *a-d*); whilst the extremely elongate-oval is shown from Comber, Co. Down (Pl. XXI, f. 14 & 38 *a, b*), and the River Po (Pl. XXI, f. 16 & 34 *a, b*). An approach to the trigonal form of *P. casertanum* is that from Walworth Wood, Co. Londonderry (Pl. XXI, f. 39 *a, b*).

In degree of inflation this species varies greatly: the example from Woodburn Dam, Co. Antrim (Pl. XXI, f. 6) is about normal. The extreme compression appears in specimens from Bracebridge, Warwick (Pl. XXI, f. 4) and Kilcorrig, Co. Antrim (Pl. XXI, f. 5), whilst an abnormally tumid example is shown from Comber, Co. Down (Pl. XXI, f. 8).

A case of abnormal dentition was met with in an individual from Walworth Wood, Co. Londonderry (Pl. XXI, f. 35 *a, b*), the left valve having two anterior lateral teeth.

The specimens in the Hanley Collection (B.M. 1907. 12. 30 : 512-515) labelled "*P. pusillum*, British," proved to be *P. personatum*, and judging from the figure may have been utilized by Forbes and Hanley for their illustration (63, pl. xxxvii, f. 10).

## DISTRIBUTION.

SI

OI

		NS	CA
HB		ES	
S	RW RE EL BF AN		
	WI EI PN AS		
M	AM PM FF KI		
.	DN SG PC KF		
I	RF LL ED HD		
B	AY LA PE BW NN		
WD	ED LD AN	WT KB DF SK RX SN	
FE	TY AR DO	CU WL NY DM	
WM	SL LE MO	IM	ML MY EY
EM	RO CV LH		SL WY SY LN
WG	NG LF WH ME	CR A DB FT CH DY NM LS	
SG	KC KD DU	MN MG SP ST LR CB WN EN	
CL	NT QC CW WI	CD RA HF WO WW NO HU WS ES	
NK	LK ST KK WX	PB CM BR GE OX BX BD HT NE	
SK	MC EC WA	GM MM GW NW BK MX SE	
WC		NS SW NH SR WK EX	
		L ND SS DT SH WX EX	
		EC SO IW	
SC	WC		

CI

*Pisidium pusillum.*

(Recent occurrences are shown in red; fossil occurrences by a line below the symbols. For the explanation of the symbols see p. 20.)

## RECENT.

## ENGLAND.

LONDON.—L.

Acton Green [C. S.]; Barnes [J. E. C.]; Ealing [W. M. W.].

BERKS.—BK.

Cothill [H. C. N.]; Wendover Canal [C. O.].

BUCKINGHAMSHIRE.—**BX.**

Chesham [J. E. C.]; Halton [J. E. C.]; Iver [J. E. C.]; near Leighton Buzzard [J. E. C.]; Weston Turville [J. E. C.]

CAMBRIDGESHIRE.—**CB.**

[Gray Coll., B.M. 1912. 12. 5 : 56-58.]

CHESHIRE.—**CH.**

Ashley [C. O.]; Baguley [C. O.]; Birkenhead [T. R.]; Budworth [A. S. K.]; Knutsford [C. O.]; Marston (Northwich) [C. O.]; Northern Etchells [C. O.]; Peckham Mere [C. O.]; Sale Meadows [C. O.]

CUMBERLAND.—**CU.**

Abbey Holme [J. L.]; Allonby [W. J. F.]; Bassenthwaite [W. J. F.]; Blaithwaite [J. L.]; Derwentwater [J. L.]; Wreay [J. L.]

DEVONSHIRE, NORTH.—**ND.**

Morthoe district [J. L.]

DEVONSHIRE, SOUTH.—**SD.**

Topsham [C. O.]

DURHAM.—**DM.**

Mainsforth [B.M. 1911. 10. 26 : 7942-45].

HERTFORDSHIRE.—**HT.**

Broxbourne [J. E. C.]; Gt. Gaddesden [C. O.]; Marsworth Reservoir [C. O.]; Rickmansworth [C. O.] [J. E. C.]; Totteridge [J. E. C.]

KENT, EAST.—**EK.**

Minster [J. E. C.]; Sissinghurst [A. S. K.]

KENT, WEST.—**WK.**

Plumstead (Abbey Wood) [J. E. C.]

LANCASHIRE, SOUTH.—**LS.**

Southport [H. C. N.]; Tarleton [J. W. J.]

LEICESTERSHIRE.—**LR.**

Aylestone [C. O.]

LINCOLNSHIRE, NORTH.—**LN.**

Alvingham (Louth Canal) [C. S. C.]; Caistor (Croxby Pond) [C. S. C.]; Cleatham [C. S. C.]

MIDDLESEX.—**MX.**

Hampton Court [J. E. C.]; Uxbridge [J. E. C.]; Yiewsley [J. E. C.]

NORTHUMBERLAND, SOUTH.—**SN.**

Jesmond (Newcastle) [C. O.]

NOTTINGHAMSHIRE.—**NM.**

Hovingham [C. O.]; Nottingham [C. O.]; Sutton [C. O.]

OXFORDSHIRE.—**OX.**

Marston Copse [H. C. N.]; Rejectamenta of the R. Cherwell, Oxford [H. C. N.]

SHROPSHIRE.—**SP.**

Church Stretton [H. O.]

SOMERSETSHIRE, NORTH.—**NS.**

Glastonbury [H. O.]; Kenn [B.M. 1911. 10. 26 : 7810-27]; Kenn Moor [B.M. 1911. 10. 26 : 7763-65].

**STAFFORDSHIRE.—ST.**

Barlaton [C. O.]; Cannock Chase [H. O.]; Cheadle [C. O.];  
Gt. Barr Park [H. O.]; Himley [H. O.]; Willenhall [H. O.]

**SURREY.—SR.**

Byfleet [W. M. W.]; Chertsey Mead [B. B. W.]; Thames  
(Kew to Richmond) [W. M. W.]

**WARWICKSHIRE.—WW.**

Sutton Coldfield district [H. O.] [W. M. W.]

**WORCESTERSHIRE.—WO.**

Claines [C. O.]; Worcester [C. O.]; Yardley Wood [H. O.]

**YORKSHIRE, SOUTH-WEST.—WY.**

Halifax [W. Cash].

**ISLE OF MAN.—IM.**

[B.M. 59. 5. 23 : 12]; near Ballaugh [F. T.]

**ISLE OF WIGHT.—IW.**

Sandown [H. C. N.]

**CHANNEL ISLANDS.—CI.**

Guernsey [J. E. C.]

**WALES.****ANGLESEY.—A.**

Cemmaes [C. S.]; Gaerwen [J. E. C.]; Holland Arms [J. E. C.];  
Pentraeth [J. E. C.]; Rhosneigr [C. O.] [J. E. C.]

**CARNARVONSHIRE.—CR.**

Flynnon Lloer (2250') [C. O.]; Llynan Diwaunedd, Moel  
Siabod (1208') [C. O.]; Llynan Mymbyr (588') Capel Curig  
[C. O.].

**PEMBROKESHIRE.—PB.**

Tenby [W. M. W.] [H. O.]

**SCOTLAND.****BUTE & CLYDE Is.—B.**

Arran, Garbad, L. (900'), Uriel, L. (1200') [K. H. J.]; Bute,  
Fad, L. [A. W. S.]

**DUMFRIES.—DF.**

Lochmaben [A. S. K.]

**INVERNESS, EAST.—EI.**

Ness, L. (at depth of 250'-700') [W. M. W.]

**KIRKCUDBRIGHTSHIRE.—KB.**

Creetown [E. C.]

**SHETLANDS.—SI.**

Bressay [Camb.]

**WIGTONSHIRE.—WT.**

Whithorn [E. C.]

## IRELAND.

## ANTRIM.—AN.

Antrim (Six-Mile-Water) [D. M.] [J. N. M.]; near Carnlough (Loughs, 1000', to W. of) [H. T.]; Dhu, L., Sallagh Braes (1,100') [A. W. S.]; Drum Bridge [J. N. M.]; Glenshesk [D.M.]; Kilcorrig [J. N. M.]; Lagan Canal [J. N. M.]; Neagh, L. [C. O.] [D. M.]; Woodburn [D. M.] [A. S. K.].

## ARMAGH.—AR.

Corrs Quarry [D. M.]; Newry Estuary [D. M.].

## CARLOW.—CW.

Tinnahinch [R. A. P.].

## CLARE.—CL.

Ballyvaughan [D. M.]; Cratloe Lakes [R. A. P.]; Derg, L. [D. M.]; Ennistymon [R. A. P.]; Goller Lake [R. A. P.]; Inishmore (Aran Is.) [R. A. P.]; Porteen, L. [F. T.].

## CORK, WEST.—WC.

Avanl, L., Glengariff [R. A. P.] [K. H. J.]; Coomerkane, L. [K. H. J.]; Mt. Gabriel [R. A. P., very oval].

## DONEGAL, EAST.—ED.

Aapple, L. [H. T.]; Aghvog, L. [H. T.]; Awaddy, L. [H. T.]; Ballywara, L. [H. T.]; Columbkille [H. T.]; Derg, L. [H. T.]; Fad, L. [J. N. M.]; Lee, L. [H. T.].

## DONEGAL, WEST.—WD.

Carnboy, L. [A. S. K.]; Fern, L. [J. N. M.]; More, L. [A. W. S.]; Purt, L., Dunfanaghy [D. M.]; Rosapenna, L. [A. W. S.] [J. N. M.]; Shivnagh, L. [H. T.]; Tory I. [J. N. M.].

## DOWN.—DO.

Avoniel [D. M.]; Comber [J. N. M.]; Drum Bridge [J. N. M.]; Lagan Canal [J. N. M.]; Newry Estuary [D. M.]; Newtownards [J. N. M.]; Portavoe [D. M.]; Saintfield [J. N. M.].

## DUBLIN.—DU.

Milltown [R. A. P.]; Portmarnock [D. M.]; Sutton [D. M.].

## FERMANAGH.—FE.

Awaddy, L. [H. T.]; Bigwood (Rules Pond) [H. T.]; Derrintrig, L. [H. T.]; Enniskillen [A. S. K.]; Fir, L. [H. T.]; Glencreawan, L. [H. T.]; Mallybreen, L. [H. T.]; Meenaghmore, L. [H. T.]; Nafeola, L. [H. T.]; Navar, L. [H. T.]; Scolban, L. [H. T.]; Shean North, L. [H. T.]; Tully Lough [H. T.]; Tullylough More [H. T.]; Tullynaloob, L. [H. T.]; Tullyvogy, L. [H. T.].

## GALWAY, NORTH.—NG.

Ballindooly [R. A. P.]; Clonbrock [D. M.]; Menlough [D. M.] [A. S. K.].

## GALWAY, SOUTH.—SG.

Atorisk, L. [R. A. P.]; Ballinasloe [R. A. P.]; Derg, L. [D. M.]; Kilmacduagh [R. A. P.]; Rea, L. [R. A. P.]; Tallanafrankagh, L. [R. A. P.]; Woodford (L. Atlee) [R. A. P.].

## GALWAY, WEST.—WG.

Callow, L. [D. M.]; Inishbofin [A. W. S.]; Oughterard [R. A. P.].

**KERRY, SOUTH.—SK.**

Dingle Promontory [A. W. S.]

**LIMERICK.—LK.**

Dromore [R. A. P.]

**LONDONDERRY.—LD.**

Coolkeeragh [J. N. M.]; Culmore [J. N. M.]; Enagh, L. [J. N. M.]; Walworth Wood [J. N. M.]

**MAYO, WEST.—WM.**

Achill, I. [A. W. S.]; Bunnamucka, L., near Newport [A. W. S.]; near Carrowmore [A. W. S.]; Clare, I. [A. S. K.]; Crewaghaun, L., nr. Newport [A. W. S.]; Dooaghtry, L. [A. W. S.]; Inish Turk [A. W. S.]; Mask, L. (120'-160') [A. S. K.]; Roonah, L., Louisburgh [A. W. S.]

**MONAGHAN.—MO.**

Glaslough [D. M.]; Ross, L. [J. N. M.]

**QUEEN'S COUNTY.—QC.**

Nut Grove [D. M.]; Rathdowney [R. A. P.]

**SLIGO.—SL.**

Cliffoney [D. M.]; Collooney [D. M.]; Talt, L. [A. S. K.]

**TIPPERARY, NORTH.—NT.**

Cloughjordan [R. A. P.]; Derg, L. [D. M.]; Finnoe [D. M.]

**TIPPERARY, SOUTH.—ST.**

Thurles [R. A. P.]

**WATERFORD.—WA.**

Near Waterford [A. W. S.]

**WESTMEATH.—WH.**

Drin, L., Mullingar [A. W. S.]

**WEXFORD.—WX.**

Enniscorthy [R. A. P.]

**FOSSIL.****HOLOCENE.****LONDON.—L.**

Between Canning Town & Stratford [B.M.—10046 *pars*]; Chingford [A. S. K.]; Lea Valley [A. S. K.]; London County Council Hall, Westminster Bridge Road [A. S. K.]; London Wall [A. S. K.]; New Scotland Yard [B. B. W.]; Shand St. (Bed B) [A. S. K.]; West India Docks [M. P. G.]

**BERKSHIRE.—BK.**

Newbury [A. S. K. & B. B. W.]

**BUCKINGHAMSHIRE.—BX.**

Boveney [J. E. C.]

**ESSEX, NORTH.—NE.**

Shalford [A. S. K.]

**ESSEX, SOUTH.—SE.**

Dagenham [A. S. K.]

**GLOUCESTERSHIRE, WEST.—GW.**

Westbury-on-Severn [A. S. K.]

**HERTFORDSHIRE.—HT.**

Hitchin [A. S. K.]

**HUNTINGDONSHIRE.—HU.**

St. Ives [A. S. K.]

**LANCASHIRE, MID.—ML.**

Hawes Water, Silverdale [A. S. K.] [J. W. J.]; Warton Crag (Dog Holes) [J. W. J.]

**MIDDLESEX.—MX.**

Uxbridge [A. S. K.]

**OXFORDSHIRE.—OX.**

Clifton-Hampden (Beds B & C) [A. S. K.]

**SUFFOLK, EAST.—ES.**

Blythburgh [A. S. K.]

**SUFFOLK, WEST.—WS.**

Knettishall [A. S. K.]

**SURREY.—SR.**

Near Staines [A. S. K.]

## SCOTLAND.

**EDINBURGH.—ED.**

Edinburgh (Corstorphine) [A. S. K.]; (Meadows) [B.M. 98005 *parts*].

**KINROSS & FIFE.—KF.**

Elie [A. S. K.]

## IRELAND.

**ANTRIM.—AN.**

Megaberry [A. W. S.]

**CLARE.—CL.**

Caherhene, L. [A. S. K.]; Inchiquin, L. [A. S. K.]; Monana, L. [A. S. K.]; Rinro [A. S. K.]

**DOWN.—DO.**

? Ballyfinder [A. S. K.]; Hillsborough [A. W. S.]

**DUBLIN.—DU.**

Dunsoughly [A. S. K.]

**FERMANAGH.—FE.**

Carra, L. [A. S. K.]; Kilnamadoo [A. S. K.]; Magheragera [A. S. K.]

**GALWAY, NORTH.—NG.**

Clonbrock [D. M.]; Menlough [A. S. K.]

**GALWAY, SOUTH.—SG.**

Ballinasloe [R. A. P.]; Portumna [R. A. P.]

**KING'S COUNTY.—KC.**

Eglish [A. S. K.]

**MAYO, EAST.—EM.**

Lakelands [A. S. K.]; Manulla Junction [A. W. S.]

**MEATH.—ME.**

? Kells [A. S. K.]; Mentrims, L. [A. S. K.]

## AGE DOUBTFUL.

CAMBRIDGESHIRE.—CB.

Chatteris [Prestwich Coll., B.M.—L. 23951].

ESSEX, NORTH.—NE.

Copford [A. S. K. & B. B. W.] [B.M. 14862 *pars* & L. 6678 & 18610] [M. P. G.]; Raine [B.M.—L. 6680].

WORCESTERSHIRE.—WO.

Defford [Prestwich Coll.: B.M.—L. 23954].

## PLEISTOCENE.

LONDON.—L.

Shacklewell Lane [Prestwich Coll., B.M.—L. 23976].

BEDFORDSHIRE.—BD.

Biddenham [Prestwich Coll., B.M.—L. 23964].

CAMBRIDGESHIRE.—CB.

Barnwell [A. S. K.].

ESSEX, SOUTH.—SE.

Ilford [A. S. K. &amp; B. B. W.].

HUNTINGDONSHIRE.—HU.

Woodston [C. E. Y. K.].

KENT, WEST.—WK.

Swanscombe [A. S. K. &amp; B. B. W.].

MIDDLESEX.—MX.

Ponder's End (Glacial) [A. S. K.].

NORTHAMPTONSHIRE.—NO.

Overton Longville [Prestwich Coll., B.M.—L. 23970].

SUSSEX, WEST.—WX.

West Wittering [A. S. K.].

WORCESTERSHIRE.—WO.

Birlingham, near Pershore [A. S. K.]; Bricklehampton, near Pershore [A. S. K.].

## CROMERIAN.

NORFOLK, EAST.—EN.

West Runton [A. S. K.] [M. P. G.].

This species is so imperfectly known on the Continent that one can only give the localities whence it has been personally recognized. These, however, show that it is widely spread: they are:—Scandinavia [Lynge Coll.], Bavaria and Transylvania [Norman Coll., B.M. 98.5.20: 22272-3; 22548-9 & 22550-2], Lake Lucerne (63-120 m.) described as *P. clessini*, Surbeck (168, p. 482)\*, River Po, also Naples and Sicily [Bellini Coll.].

As a fossil it has been met with in the Pleistocene (Campinien) of Brussels [Mus. Hist. Nat. Brussels].

\* Many of Clessin's species from the deep waters of Swiss lakes probably also belong to this species.

### 7. *Pisidium milium*, Held.

[Pls. II, f. 10; IV, f. 3; XXIX, f. 7-30.]

- 1832. *Pisidium pulchellum*, var.  $\delta$ : Jenyns, Trans. Camb. Phil. Soc. iv, p. 306, pl. xxi, f. 4 & 5.
- 1836. *Pisidium milium*: Held, Isis, 1836, col. 281. [Fide Clessin, Malak. Blatt. xviii, 1871, 190; xix, pl. i, f. 1.]
- 1849. *Pisidium gassiesianum*: Dupuy, Cat. extram. Galliae Test. [Feb., 1849] [p. 4] No. 232: Gassies, Tabl. Moll. Agenais [Mar., 1849] p. 207, pl. ii, f. 11; Dupuy, Hist. Nat. Moll. France, 1852, p. 685, pl. xxx, f. 7.
- *Pisidium normandianum*: Dupuy, Cat. extram. Galliae Test. [p. 4] No. 235; id., Hist. Nat. Moll. France, 1852, p. 686, pl. xxxi, f. 1.
- 1854. *Pisidium tetragonum*, Nob.: Normand, Coup d'œil Cyclades Nord, p. 5.
- 1855. *Pisidium baudonianum*, P. de Cess.: Cessac, Bull. Soc. Sci. Nat. La Creuse, ii, p. 74.
- *Pisidium arcaeforme*, n. sp.: Malm, Götheborgs K. Vet. & Vitt. Samh. Handl., N.F. iii, p. 101, figs.
- 1856. *Pisidium cazertanum*,  $\epsilon$ . *normandianum* &  $\eta$ . *gassiesianum*: Moquin-Tandon, Hist. Nat. Moll. France, ii, pp. 584 & 585.
- *Pisidium pusillum*,  $\delta$ . *alligatum*, Baudon MS.: Baudon in Moquin-Tandon, Hist. Nat. Moll. France, ii, p. 587.
- *Pisidium pusillum*,  $\epsilon$ . *quadrilaterum*, Baudon MS.: id., loc. cit.; Baudon, Mém. Soc. Acad. Oise, iii, 1857, p. 333, pl. i, f. D.
- 1857. *Pisidium gassiesianum*, var. C. *alligata*, nob.: Baudon, tom. cit. pp. 338 & 341, pl. ii, f. A.
- 1859. *Pisidium roseum* [Jeff. non] Scholtz: Jeffreys, Ann. & Mag. Nat. Hist., Ser. III, vol. iii, p. 38, pl. ii, f. 3 a-c; id., Brit. Conch. i, 1862, p. 26.
- 1890. *Pisidium casertanum*, var. *gassiesianum*: Westerlund, Fauna palæarct. Region, vii, p. 28.

That Jenyns failed to recognize the distinctness of this species when he wrote his Monograph is certainly strange, but the examples before him belonged curiously enough to the less common, rounded form. It has of course been long known that Jenyns' *Pisidium pulchellum*, var.  $\delta$  was the form in question, and specimens so marked and endorsed on the bottom of the box "These specimens examined and pronounced correct by Revd. L. Jenyns" from the late C. Ashford's collection were in the possession of the late Rev. R. Ashington Bullen.

As already mentioned (*ante*, p. 8) Held's name has been adopted for this form on the testimony of Clessin, for, as will be seen, the original diagnosis (77, col. 281) is very scanty, it reads:—

"P. testa globosa, subtrigono-retandata, albicante, pellucida, striata, margine sub-hebetata, natibus prominulis, retusis."

In 1849 it was recognized in France, and between that date and 1857 variously described under different names. From these descriptions Baudon's (9, p. 339) may be taken as being the best:—

"Concha tetragona, antice præsertim parum elongata, sub-ventricosa, subobliqua, nitida, corneo-lutea aut flavidula; margine subrecto; apice rotundato, prominente, striis regularibus, aliis crassis, aliis tenuibus. Cañine recto, tenui;

dentibus cardinalibus minimis, saepe subnullis lateralibus compressis, vix prominulis, ligamento brevi, minimo."

The further description of the hinge-characters necessary to supplement the above is as follows:—

*Hinge* (Pl. II, f. 10; IV, f. 3) about  $\frac{2}{3}$  the length of the shell, fairly strong, narrow, especially the middle third under the umbo, projecting slightly inwards, slightly curved, with two flexures.

R.V. *a. I.* about  $\frac{2}{3}$  the length of the hinge-line, narrow, strong, slightly bowed inwards; *base* strong, straight; *apex* near distal end, prominent, bluntly obtuse; *ridges* fairly sharp, about equally steep, the umbonal descending about twice as low as the distal.

*a. III.* about  $\frac{1}{3}$  the length of, and parallel to *a. I.*, straight, narrow, outwardly inclined; *apex* central, very obtuse-pointed; *ridges* sharp and descending equally and gradually.

3. lamelliform, sharp, not very prominent, flat-topped, faintly arcuate, parallel with the shell-margin.

*p. I.* about  $\frac{1}{4}$  the length of the hinge-line, very narrow, strong, faintly bowed inwards; *base* fairly strong, shelving down into the shell-wall; *apex* near distal end, not very prominent, pointed, obtuse; *ridges* somewhat rounded, umbonal descending gradually to a lower level than the distal which is somewhat steeper.

*p. III.* about  $\frac{1}{3}$  the length of, and parallel to *p. I.*, narrow, somewhat outwardly inclined; *apex* distal side of centre, not very prominent; *ridges* sloping fairly gradually and equally.

L.V. *a. II.* about  $\frac{2}{3}$  the length of the hinge-line, fairly narrow, slightly bowed inwards; *base* strong, shelving down into the shell-wall; *apex* distal side of centre, very prominent and acuminate; *ridges* sharp, distal descending very steeply at first and then gradually, umbonal very steeply to a lower level than the distal.

2. prominent, very obtusely triangular, parallel with hinge-margin; *apex* outwardly directed.

4. lamelliform, sharp, slightly arcuate, curving round and parallel to the apex of 2.

*p. II.* about  $\frac{1}{4}$  the length of the hinge-line, narrow, strong, slightly inwardly bowed; *base* strong, shelving down into shell-wall; *apex* near distal end, very prominent, acuminate; *ridges* sharp, umbonal sloping gradually, distal very steeply.

*Dimensions.*—Held's specimens must have been very small, for his measurements converted into millimetres are:—Long. 1·8, Alt. 1·6, Crass. 1·5 mm. Baudon gives 2·5 or  $3 \times 2\cdot5$  or  $3 \times 2\cdot5$  and Clessin  $3\cdot2 \times 2\cdot5 \times 2\cdot3$  mm., but a specimen from Cemmaes Bay (Anglesey) is  $3\cdot6 \times 3 \times 2\cdot7$  and one in Mr. Oldham's collection from Dean Row, Wilmslow (Cheshire), attains  $3\cdot75 \times 3 \times 2\cdot25$  mm.

As a rule this species is recognizable at the first glance owing to its quadrangular shape (Pl. XXIX, f. 16 *a*, 23 & 27). In the few instances in which it assumes a rounded exterior and approaches other species in form, it is at once known by the very narrow and fairly straight hinge-line and the slender cardinals which run in the direction of the hinge-line and in the left valve are parallel to each other.

Pl. XXIX, f. 22 shows one of the more rounded forms similar to Jenyns' *Pisidium pulchellum*, var.  $\delta$ .

Fig. 8 on the same plate shows an example whose inflation is a little in excess of the normal, fig. 9 one of maximum inflation and fig. 11 a flattened form. Figs. 10 & 30 illustrate the peculiar variant of the species occurring in the Holocene at Gayfield, Edinburgh, in which the umbones are strangely produced.

## DISTRIBUTION.

81

01

					NS	CA
HB			SS			
	RW	RE	EL	BF	AN	
S	WI	EI	PN	AS		
	AM	PM	FF	KI		
M	DN	SG	PC	KF		
	B					
J	CT	RF	LL	<u>ED</u>	HD	
		AY	LÀ	PE	BW	NN
WD	ED	LD	AN	WT	KB	DF
	FE	TY	AR	<u>DO</u>		SK
WM	SL	LE	MO		IM	
						CU
EM	RO	CV	LH			WL
WG	NG	LE	WH	<u>ME</u>		NY
						DM
SG	KC	KD	DU		ML	MY
CL	NT	QC	CW	WI		EY
					SL	WY
					SY	LW
WK	LK	ST	KK	WX	A	
					CR	
					DB	CH
					DY	NM
					LS	
					MM	MG
					SP	ST
					LR	<u>CB</u>
						WN
						EN
						ES
					CD	RA
					HF	WO
					WW	NO
					HU	WS
						HT
						NE
SK	MC	EC	WA		PB	CM
					BR	GE
					<u>OX</u>	BX
					BD	
					GM	MM
					GW	NW
					<u>BK</u>	MX
						SE
					SR	<u>LWK</u>
WC						EK
					L	
					ND	SS
					DT	SH
					<u>WX</u>	EX
					EC	SD
						IW
					SC	WC

61

*Pisidium milium.*

(Recent occurrences are shown in red: fossil occurrences by a line below the symbols. For the explanation of the symbols see p. 20.)

## RECENT.

## ENGLAND.

LONDON.—**L.**

Acton [J. E. C.]; Blackheath [B.M. 98.5.20: 22517-35  
*pars*]; Fulham [T. R.] [B.M. 85.8.16: 13-21]; Hampstead  
[J. E. C.]; Hendon [J. E. C.].

BERKSHIRE.—**BK.**

Old Windsor [J. E. C.]; Wendover Canal [C. O.].

BUCKINGHAMSHIRE.—**BX.**

Chesham [J. E. C.]; Denham [J. E. C.]; Halton Canal  
[J. E. C.]; near Leighton Buzzard [J. E. C.].

CHESHIRE.—**CH.**

Adlington [C. O.]; Alderley Edge [C. O.]; Ashley [C. O.];  
Baguley [C. O.] [T. R.]; Bredbury [C. O.]; Budworth [A. S. K.];  
Dean Row (Wilmslow) [C. O.]; Kelsall [C. O.]; Malpas  
[C. O.]; Northern Etchells [C. O.]; Romiley [C. O.].

CUMBERLAND.—**CU.**

Blaithwaite [J. L.]; Bassenthwaite [W. J. F.]; near Carlisle  
(?)[J. L.]; Corby [J. L.].

DEVONSHIRE, NORTH.—**ND.**

Braunton [J. L.]; Morthoo district [J. L.].

DURHAM.—**DM.**

Mainsforth [B.M. 1911.10.26: 7939-41].

ESSEX, SOUTH.—**SE.**

Chelmsford (R. Cann) [W. M. W.].

HAMPSHIRE, SOUTH.—**SH.**

R. Itchen, Southampton [B.M. 1911.10.26: 7774].

HERTFORDSHIRE.—**HT.**

Ashridge [C. O.]; Broxbourne [J. E. C.]; Gt. Gaddesden  
[C. O.]; Rickmansworth [C. O.]; Totteridge [J. E. C.].

KENT, WEST.—**WK.**

Keston [A. S. K.]; Penshurst [A. S. K.]; Plumstead [A. S. K.].

LANCASHIRE, SOUTH.—**SL.**

Liverpool [A. S. K.]; Oldham [W. M. W.] [A. S. K.].

LEICESTERSHIRE.—**LR.**

Aylestone [C. O.].

LINCOLNSHIRE, NORTH.—**LN.**

Caistor [C. S. C.]; Cleathem [C. S. C.]; Haugham (Skirbeck)  
[C. S. C.]; Revesby [C. S. C.]; South Kelsey [C. S. C.]; Tath-  
well [C. S. C.]; Tetney [C. S. C.].

MIDDLESEX.—**MX.**

Bushey Park [J. E. C.]; Colnbrook [J. E. C.]; Edgeware  
[J. E. C.]; Enfield [J. E. C.]; Harefield [J. E. C.]; Ponder's  
End [J. E. C.]; Stanmore [J. E. C.]; West Drayton [J. E. C.].

NORFOLK, EAST.—**EN.**

Norwich [B. B. W.].

**NORFOLK, WEST.—WN.**

Castle Rising [J. E. C.]

**NOTTINGHAMSHIRE.—NM.**

Hoveringham [C. O.]; Nottingham [C. O.]; Sutton [C. O.]  
[T. R.]

**OXFORDSHIRE.—OX.**

Marston Ferry (R. Cherwell) [H. C. N.]

**SOMERSETSHIRE, NORTH.—NS.**

Glastonbury [H. O.]; Kenn Moor [B.M. 1911. 10. 26 : 7762];  
Walton Moor [B.M. 1911. 10. 26 : 7742-48].

**SOMERSETSHIRE, SOUTH.—SS.**

Dunster [C. O.]

**STAFFORDSHIRE.—ST.**

Cannock Chase [H. O.]; Gt. Barr Park [H. O.]; near Stafford  
(Canal) [E. C.]; near Walsall [H. O.]

**SUFFOLK, EAST.—ES.**

Blythburgh [A. S. K.]; Lowestoft [A. M.]; Southwold  
[J. E. C.]

**SUFFOLK, WEST.—WS.**

Santon Downham [A. M.]

**SURREY.—SR.**

Dorking [B.M. 86. 7. 26 : 78-79]; Chertsey Mead [B. B. W.];  
Thames (Kew to Richmond) [W. M. W.]

**WARWICKSHIRE.—WW.**

Sutton Coldfield district [H. O.]

**YORKSHIRE, NORTH-EAST.—EY.**

Trenholme Bar [W. M. W.]; York [B.M. 40. 10. 16 : 143-48].

**YORKSHIRE, MID-WEST.—MY.**

Baildon [B. B. W.]; York [B.M. 40. 10. 16 : 143-48].

**YORKSHIRE, SOUTH-EAST.—SY.**

York [B.M. 40. 10. 16 : 143-48].

**YORKSHIRE, SOUTH-WEST.—WY.**

Ackworth [Ashford Coll.—R. A. Bullen].

**ISLE OF MAN.—IM.**

Near Ballaugh [F. T.]

**WALES.****ANGLESEY.—A.**

Cemmaes [C. S.] [J. E. C.]; Gaerwen [J. E. C.]; Pentraeth  
[J. E. C.]; Rhosneigr [C. O.] [J. E. C.]

**CARNARVONSHIRE.—CR.**

Criccieth [J. E. C.]; Flynnnon Lloer (2250') [C. O.]

**GLAMORGANSHIRE.—GM.**

Llandaff [B. B. W.]

**MERIONETHSHIRE.—MN.**

Gwernen Lake [J. E. C.]

**PEMBROKESHIRE.—PB.**

Tenby [C. S.] [J. E. C.] [H. C. N.]

## CHANNEL ISLANDS.—CI.

Guernsey [J. E. C.].

## SCOTLAND.

## BUTE, ARRAN, &amp;c.—B.

Fad, L., Bute [A. W. S.].

## DUMFRIES.—DF.

Lochmaben [A. S. K.].

## HADDINGTONSHIRE.—HD.

Luffness Links [C. S.].

## ISLAY, &amp;c.—I.

Colonsay (Killoran) [K. H. J.].

## SELKIRK.—SK.

Meigle Moss [A. S. K.].

## IRELAND.

## ANTRIM.—AN.

Antrim (River) [D. M.]; Belfast (Belvoir Pk.) [D. M.]; Glenavy, R. [D. M.]; Glenshesk [D. M.]; Lagan Canal [J. N. M.] [D. M.]; Neagh, L. [C. O.] [D. M.]; Portmoe Lake [D. M.]; Woodburn Dam [A. S. K.].

## CARLOW.—CW.

Tinnahinch [R. A. P.].

## CLARE.—CL.

Cratloe Lakes [R. A. P.]; Derg, L. [D. M.]; Dromoland [R. A. P.]; Glenroe [D. M.]; Goller Lake [R. A. P.]; Inishmore (Aran Is.) [R. A. P.]; Porteen, L. [F. T.].

## CORK, MID.—MC.

Cork Park; Inniscarra [R. A. P.].

## CORK, WEST.—WC.

Clear, I.

## DONEGAL, EAST.—ED.

Acapple, L. [H. T.]; Acheson's, L. [H. T.]; Fad, L. near Moville [D. M.] [J. N. M.]; Meenaskenagh, L. [H. T.].

## DONEGAL, WEST—WD.

Fern, L. [J. N. M.]; Melmore, L. [A. W. S.]; More, L. [A. W. S.]; Rosapenna, L. [A. W. S.] [J. N. M.].

## DOWN.—DO.

Comber [J. N. M.]; Glasmoor, Comber [D. M.]; Lagan Canal [J. N. M.]; Newtownards [J. N. M.]; Portavoe [D. M.]; R. Quoile [D. M.]; Saintfield [J. N. M.].

## DUBLIN.—DU.

Lambay I. [A. W. S.].

## FERMANAGH.—FE.

Aguse More, L. [H. T.]; Macroagh, L. [H. T.]; Nafeola, L. [H. T.]; Nawalsky, L. [H. T.]; Scolban, L. [H. T.]; Tully Lough [H. T.]; Tullylough More [H. T.]; Tullyvogy, L. [H. T.]

## GALWAY, NORTH.—NG.

Ballindooley [R. A. P.]; Ballymoe [D. M.]; Menlough [D. M.] [A. S. K.]

## GALWAY, SOUTH.—SG.

Ballinasloe [R. A. P.]; Derg, L. [D. M.]; Portumna [R. A. P.]; Rea, L. [R. A. P.]; Tallanafrankagh, L. [R. A. P.]; Wooddorf (L. Atlee) [R. A. P.]

## GALWAY, WEST.—WG.

Callow, L. [D. M.]; Inishbofin [A. W. S.]; Oughterard [R. A. P.]

## KERRY, NORTH.—NK.

Killarney [B.M. 59. 6. 16 : 6].

## KERRY, SOUTH.—SK.

Dingle Promontory [A. W. S.]; Nagarriva, L. [R. A. P.]

## KILDARE.—KD.

Monasterevin [D. M.]

## LONDONDERRY.—LD.

? Castle Rock [D. M.]; Enagh, L. [J. N. M.]; Walworth Woods [J. N. M.]

## LOUTH.—LH.

Ardee [J. N. M.]

## MAYO, WEST.—WM.

Achill, I. [A. W. S.]; Bunnamucka, L., near Newport [A. W. S.]; Cahir, I. [A. W. S.]; Clare, I. [A. W. S.]; Creevaghhaun, L., near Newport [A. W. S.]; Dougan, L., near Newport [A. W. S.]; Inishturk [A. W. S.]; S.W. Mayo [A. W. S.]

## MONAGHAN.—MO.

Glaslough [D. M.]

## QUEEN'S COUNTY.—QC.

Nut Grove [D. M.]

## ROSCOMMON.—RO.

Woote Park [D. M.]

## SLIGO.—SL.

Castletown [D. M.]

## TIPPERARY, NORTH.—NT.

Cloughjordan [R. A. P.]; Derg, L. [D. M.]; Finnoe [D. M.]

## TYRONE.—TY.

Auchnadog [D. M.]

## WATERFORD.—WA.

Near Waterford [A. W. S.]

## WESTMEATH.—WH.

Drin, L., Mullingar [A. W. S.]

## WEXFORD.—WX.

Enniscorthy [R. A. P.]; New Ross [D. M.]; Rosslare [R. A. P.]; Wexford [R. A. P.]

**FOSSIL.****HOLOCENE.****LONDON.—L.**

Chingford [A. S. K.]; London County Council Hall, Westminster Bridge Road [A. S. K.]; London Wall [A. S. K.]; Shand Street (Bed B) [A. S. K.]; Lea Valley [A. S. K.] [B.M.—L. 6750 *pars*]; Lea Valley Alluvial [A. S. K.].

**BERKSHIRE.—BK.**

Newbury [A. S. K.] [B.M.—L. 7934, 13216].

**ESSEX, SOUTH.—SE.**

Dagenham [A. S. K.].

**LANCASHIRE, MID.—ML.**

Hawes Water, Silverdale [J. W. J.].

**MIDDLESEX.—MX.**

Uxbridge [A. S. K.].

**OXFORDSHIRE.—OX.**

Clifton-Hampden (Beds B & C) [A. S. K.].

**SUFFOLK, EAST.—ES.**

Blythburgh [A. S. K.].

**SUFFOLK, WEST.—WS.**

Knettishall [A. S. K.].

**SURREY.—SR.**

Near Staines [A. S. K.].

**SCOTLAND.****EDINBURGH.—ED.**

Edinburgh (Gayfield) [M. P. G.]; Edinburgh (Corstorphine) [A. S. K.]; Edinburgh (Meadows) (B.M. 98,005 *pars*].

**IRELAND.****CLARE.—CL.**

Caherhene, L. [A. S. K.]; Inchiquin, L. [A. S. K.]; Monana, L. [A. S. K.].

**DOWN.—DO.**

Ballyfinder [A. S. K.]; Hillsborough [A. W. S.].

**FERMANAGH.—FE.**

Castle Coole, Enniskillen [A. S. K.]; Kilnamadoo [A. S. K.]; Magheragera [A. S. K.].

**GALWAY, NORTH.—NG.**

Menlough [A. S. K.].

**GALWAY, SOUTH.—SG.**

Portumna [R. A. P.].

**KILDARE.—KD.**

Ballybetagh [A. S. K.].

**KING'S COUNTY.—KC.**

Lusmagh [A. S. K.]; Eglish [A. S. K.].

**LIMERICK.—LK.**

Cappagh [A. S. K.]

**MAYO, EAST.—EM.**

Lakelands [A. S. K.]

**MEATH.—ME.**

Kells [A. S. K.]

**PLEISTOCENE.****CAMBRIDGESHIRE.—CB.**

Barrington [A. S. K.]

**HUNTINGDONSHIRE.—HU.**

Woodston [C. E. Y. K.]

**KENT, WEST.—WK.**

Crayford-Erith [A. S. K. &amp; B. B. W.]; Swanscombe [A. S. K. &amp; B. B. W.]

**SUSSEX, WEST.—WX.**

West Wittering [A. S. K.]

**CROMERIAN.****NORFOLK, EAST.—EN.**

West Runton [A. S. K.] [M. P. G.]

Abroad the species is plentiful in Scandinavia [Lyngé Coll.], in France [Baudon (9) and others] and occurs in Germany and Switzerland [Norman Coll., B.M. 98.5.20; 22553-8 & 22440], whilst Westerlund cites it from Algeria (184, p. 34).

It has been recorded from the Holocene of Denmark [Johansen, (85, p. 9)] and seen from the Pleistocene (Campinien) of Brussels [Mus. Hist. Nat. Brussels].

**8. *Pisidium pulchellum*, Jenyns.**

[Pls. II, f. 1; III, f. 8; XXIII, f. 1, 3-17, 19, 20.]

1832. *Pisidium pulchellum*, nobis: Jenyns, Trans. Camb. Phil. Soc. iv, p. 306, pl. xxi, f. 1.
1843. *Cyclas pulchella*, Jenyns: Hanley, Cat. Rec. Bivalve Shells, p. 91.
1852. *Pera pulchella*: Leach, Moll. Brit. Synop. p. 292.
1854. *Pisum pulchellum*, Jenyns: Deshayes, Cat. Conch. Brit. Mus. ii, p. 278.
1859. *Pisidium henslowianum*, var. *pulchellum*: Jeffreys, Ann. & Mag. Nat. Hist. III, iii, p. 37.
1862. *Pisidium fontinale*, var. *pulchella*: Jeffreys, Brit. Conch. i, p. 21.
1905. *Pisidium nitidum*, var. *splendens* [*pars*]: Jackson, Journ. Conch. xi, p. 170.

This, the prettiest of all our British Pisidia, was first recognized by Leach, who received it from Prof. J. S. Henslow and appropriately

named it *Pera pulchella* but never published any description. Hence it was left to Jenyns, who recorded it (83, p. 306) as :—

“ *P. testâ obliquè ovali, ventricosâ, profundius striatâ; umbonibus obtusiusculis, simplicibus.* ”

Unfortunately Jenyns had associated with it as varieties undoubted examples of *P. subiruncatum* and *P. milium* \*, so that his more extended diagnosis made to cover these becomes inapplicable.

The best specification is probably that by Malm, though the remarks as to coloration do not hold universally (106, p. 89):—

“ *C. oblique ovalis, ventricosa, profundius et eleganter striata, nitida; lutescenti-alba, sed plerumque omnino fusco-cinerea, zonisque 1–4 obscurioribus; natibus convexis, umbonibus prominulis.* ”

And he further notes :— [Translation]

“ Outline everywhere well rounded off, no prominent angle at the point of junction of the dorsal with the posterior margin. Total shape ovoid, slightly compressed and oblique. . . . Apices of the umbones situated rather far back. . . . None of the small species has so deep and at the same time so elegantly arranged striae as this.”

These deeply cut striae are typical of the species, and impart to its surface an iridescence such as that displayed by Barton's buttons, or Robert's lines.

The detailed characters of the hinge are :—

*Hinge* (Pl. II, f. 1 ; III, f. 8) about  $\frac{2}{3}$  the length of the shell, very strong and wide, projecting well inwards, uniformly arcuate.

R. V. a. 1. a little more than  $\frac{1}{3}$  the length of the hinge-line, strong, slightly curved inwards ; base very strong and swollen ; apex on distal side of centre, not very prominent, obtuse-pointed ; ridges somewhat rounded, sloping about equally, and fairly steeply.

a. III. about the length of a. 1., outwardly inclined ; apex fairly central, prominent, rounded-obtuse ; ridges compressed, somewhat sharp, sloping fairly equally, and steeply.

3. not very prominent, lamelliform, thin, sharp, top flat but slightly crenulated, slightly arcuate, parallel on the whole to the shell-margin, but the extreme posterior end (b) thickened, grooved and deflected sharply inwards.

\* Specimens named *P. pulchellum* in the Hanley Collection proved to comprise two examples, very smooth, of that species, with one of *P. subiruncatum* (B.M. 1907.12.30 : 516-18) and four of *P. milium* (B.M. 1907.12.30 : 508-11) all marked simply “British” and probably received from Jenyns.

- p. I.* about  $\frac{1}{3}$  the length of the hinge-line, narrow, strong, straight; *base* strong, slightly swollen; *apex* on distal side of centre, prominent; *ridges* somewhat sharp, descending about equally and fairly gradually.
- p. III.* about  $\frac{1}{2}$  the length of, and parallel to *p. I.*, straight, strong; *apex* central, prominent, obtuse-pointed; *ridges* somewhat rounded, descending about equally and not steeply.
- L. V. a. II.* nearly  $\frac{1}{2}$  the length of the hinge-line, narrow, strong and straight; *base* strong, somewhat swollen; *apex* central, very prominent, sharply acuminate, slightly distally directed; *ridges* sharp, descending about equally, very steeply.
2. not very prominent, subtrigonal, the rounded apex backwardly and outwardly directed, base continuous with that of *a. II.*
  4. lamelliform, sharp, arcuate, at first almost parallel with the shell-margin and then curving diagonally backwards half across the hinge-plate.
- p. II.* about  $\frac{1}{3}$  the length of the hinge-line, narrow, strong, curving with the shell-margin; *base* strong and straight; *apex* on distal side of centre, distally directed, very prominent, acuminate; *ridges* sharp, descending fairly equally and very steeply, especially at first.

*Dimensions.*—Jenyns' measurements, converted into millimetres, give: Long. 4, Alt. 3, Crass. 2·5 mm. A specimen in Mr. C. Oldham's collection from Cemmaes (Anglesey) is identical. One from Walworth (Londonderry) is  $4 \times 3\cdot3 \times 2\cdot6$ . Malm's is a trifle less, viz.:— $3\cdot75 \times 3 \times 2\cdot6$  mm.

As a rule the species is immediately recognizable by its sculpturing. Specimens in which the striæ are faint may bear some external resemblance to rounded forms of *P. nitidum*, but in *P. pulchellum* the hinge is proportionately narrower, and the outer laterals (*a. III.* & *p. III.*) longer, the apices of the inner laterals, especially the anterior ones, are further from the umbo, whilst the cardinals, especially 3 of the right valve, are straighter and more parallel to the hinge-line.

At Silverdale (Lancs.) a strongly striate form of *P. lillyeborgii* occurs in association with the present species and at first escaped detection (79). Examples of the former are consequently figured (Pl. XXIII, f. 2 & 18) with the latter for comparison.

Young forms of *P. pulchellum* are squarrose (Pl. XXIII, f. 11a & 12a) and the specimens from the Pleistocene of West Wittering, though more adult (Pl. XXIII, f. 13\*), take that form.

The most oval variant, and the largest seen, comes from Walworth (Co. Londonderry) (Pl. XXIII, f. 8, 9 & 16). Other shades of variation in outline and sculpturing are best gathered from the figures.

## DISTRIBUTION.

S I

O I

	NS	CA
HB	SS	
	RW RE EL BF AN	
S	WI EI PN AS	
	AM PM FF KI	
M	DN SG PC KF	
I	B	
CT	RF LL ED HD	
	AY LA PE BW NN	
WD ED LD AN	WT KB DF SK RX SN	
FE TY AR DO	CU WL NY DM	
WM SL LE MO	IM ML MY EY	
EM RO CV LH	A SL WY SY LN	
WG NG LF WH ME	CR DB FT CH DY NM LS	
SG KC KD DU	MN MG SP ST LR CB WN EN	
CL NT QC CW WI	CD RA HF WO WW NO HU WS ES	
NK LK ST KK WX	PB CM BR GE OX BX BD HT NE	
SK MC EC WA	GM MM GW NW BK MX SE	
WC	L NS SW NH SR WK EK	
	ND SS DT SH WX EX	
	EC SD IW	
	SC WC	

C I

*Pisidium pulchellum.*

(Recent occurrences are shown in red; fossil occurrences by a line below the symbols. For the explanation of the symbols see p. 20.)

## RECENT.

## ENGLAND.

LONDON.—**L.**

Hampstead [J. E. C.].

BUCKINGHAMSHIRE.—**BK.**

Boveney [J. E. C.]; Denham [J. E. C.]; near Leighton Buzzard [J. E. C.].

CHESHIRE.—**CH.**

Birkenhead [E. R. S.]; Knutsford [C. O.]; Marston, near Northwich [C. O.]; Northern Etchells [C. O.].

CUMBERLAND.—**CU.**

Bassenthwaite [W. J. F.].

DEVONSHIRE, SOUTH.—**SD.**

Newton Abbot District [B. B. W.]; Topsham [C. O.].

**HERTFORDSHIRE.—HT.**

Aldenham [C. O.]; Rickmansworth [C. O.].

**LANCASHIRE, MID.—ML.**

Haweswater, Silverdale [C. O.] [J. E. C.] [J. W. J.].

**LANCASHIRE, SOUTH.—SL.**

Southport [E. R. S.] [T. R.].

**LINCOLNSHIRE, NORTH.—LN.**

Tetney [C. S. C.].

**MIDDLESEX.—MX.**

Bedfont [J. E. C.]; Bushey Park [J. E. C.]; Harefield [J. E. C.]; West Drayton [W. M. W.].

**NORTHAMPTONSHIRE.—NO.**

Kettering (Hot water tank c. 70°) [C. E. W.].

**NOTTINGHAMSHIRE.—NM.**

Beeston Cut [C. S.]; Nottingham [C. O.].

**OXFORDSHIRE.—OX.**

Oxford [H. C. N.].

**SOMERSETSHIRE, NORTH.—NS.**

Walton Moor [B.M. 53.12.6: 32-41 *pars* & 1911.10.26: 7737].

**SUFFOLK, WEST.—WS.**

Mildenhall [A. M.].

**SURREY.—SR.**

Byfleet [W. M. W.]; Chertsey Mead [B. B. W.].

**WARWICKSHIRE.—WW.**

Birmingham [T. R.]; Sutton Coldfield district [H. O.] [W. M. W.].

**YORKSHIRE, NORTH-EAST.—EY.**

Scarborough [Camb.].

## WALES.

**ANGLESEY.—A.**

Cemmaes [C. O.]; Llangefni [J. E. C.]; Pentraeth [J. E. C.]; Rhosneigr [C. O.] [J. E. C.].

**CARNARVONSHIRE.—CR.**

Ffynnon Llugury, Capel Curig (1786') [C. O.].

## SCOTLAND.

**ISLAY, &c.—I.**

Colonsay (Killoran), very smooth [K. H. J.].

**SHETLANDS.—SI.**

Bressay [Camb.].

**STIRLING.—SG.**

Howietoun [B. B. W.].

**WIGTONSHIRE.—WT.** [Camb.].

## IRELAND.

**ANTRIM.—AN.**

Neagh, L. [C. O.].

**CARLOW.—CW.**

Tinnahinch [R. A. P.].

## CLARE.—CL.

Derg, L. [D. M.]; Goller Lake [R. A. P.].

## CORK, MID.—MC.

Inniscarra [R. A. P.].

## DONEGAL, EAST.—ED.

Roshin, L. [H. T.]; Rushen, L. [H. T.]; Shivnagh, L. [H. T.].

## DONEGAL, WEST.—WD.

Fern, L. [J. N. M.].

## DOWN.—LO.

Ballynahinch Junction [D. M.]; Comber [J. N. M.]; near Loughinisland [D. M.].

## FERMANAGH.—FE.

Rushen, L. [H. T.].

## GALWAY, SOUTH.—SG.

Derg, L. [D. M.]; Kilmacduagh [R. A. P.]; Rea, L. [R. A. P.]; Tallanafrankagh, L. [R. A. P.].

## LONDONDERRY.—LD.

Coolkeeragh [D. M.] [J. N. M.]; Enagh, L. [J. N. M.]; Walworth Wood [J. N. M.].

## MAYO, WEST.—WM.

Achill I. [A. W. S.]; Louisberg [A. W. S.]; Westport Station [A. W. S.].

## TIPPERARY, NORTH.—NT.

Finnoe [D. M.]; Lough Derg [D. M.].

## TIPPERARY, SOUTH.—ST.

Thurles [R. A. P.].

## TYRONE.—TY.

Roughan, L. [J. N. M.].

## WEXFORD.—WX.

Enniscorthy [R. A. P.].

## FOSSIL.

## HOLOCENE.

## LONDON.—L.

Between Canning Town and Stratford [B.M.—L. 10046 *pars*]; Chingford [A. S. K.]; Lea Valley [A. S. K.].

## ESSEX, SOUTH.—SE.

Ilford [A. S. K.].

## MIDDLESEX.—MX.

Uxbridge [A. S. K.].

## OXFORDSHIRE.—OX.

Clifton-Hampden (Beds B & C) [A. S. K.].

## SURREY.—SR.

Near Staines [A. S. K.].

## IRELAND.

## DOWN.—DO.

Ballyfinder [A. S. K.].

## MEATH.—ME.

Mentrim, L. [A. S. K.].

## AGE DOUBTFUL.

DORSET.—DT.

Portland [B.M.—L. 10023].

## PLEISTOCENE.

CAMBRIDGESHIRE.—CB.

Barrington [B.M.—L. 5712 pars].

SUSSEX, WEST.—WX.

West Wittering [A. S. K.].

## CROMERIAN.

NORFOLK, EAST.—EN.

West Runton [A. S. K.].

Although the name frequently occurs in Continental Collections generally attached to some form of *P. casertanum*, this species must be rare on the Continent, for the only living examples met with so far were from Bornholm [Lyngé Coll.].

In the fossil state it has been reported from the Holocene and Pleistocene of Denmark [Johansen (85, p. 9)] and seen from the Pleistocene (Campinien) of Soignies and Brussels [Mus. Hist. Nat. Brussels].

9. ***Pisidium subtruncatum*, Malm.**

[Pls. II, f. 3; III, f. 7; XXII.]

1822. *Cyclas obtusalis*, Lam.: Nilsson, Hist. Moll. Sveciae, p. 101. [Fide Malm, Götheborgs K. Vet. & Vitt. Samh. Handl. iii, 1855, p. 92.]
1831. *Cyclas fontinalis*, Drap.: Alder, Trans. Nat. Hist. Soc. Northumbld. i, p. 41; *id., op. cit.* ii, 1838, p. 341.
1832. *Pisidium pulchellum*, vars.  $\beta$  &  $\gamma$ : Jenyns, Trans. Camb. Phil. Soc. iv, p. 306, pl. xxi, f. 2 & 3.
1840. ? *Pisidium jenynsii* [pars]: Gray in Turtou's Manual, p. 285.
1854. *Pisidium henslowianum*, var. B.: Bourg. Rev. et Mag. Zool. vi, p. 105; *id.*, Aménit. Malac., i, 1856, p. 51.
- ? *Pisidium dupuyanum*, nob.: Norman, Coup d'œil Cyclades Nord, p. 5. [For figure see Baudon, Mém. Soc. Acad. Oise, iii, 1857, pl. iv, f. G.]
1855. *Pisidium subtruncatum*, n. sp.: Malm, Götheborgs K. Vet. & Vitt. Samh. Handl. iii, p. 92, figs.
1856. *Pisidium henslowianum*,  $\gamma$ . *pallidum*, and ?  $\epsilon$ . *dupuyanum*: Moquin-Tandon, Hist. Nat. Moll. France, ii, p. 581; Baudon, Mém. Soc. Acad. Oise, iii, 1857, p. 357 & 360, pl. iv, f. G & H.
1862. *Pisidium fontinale*, var. *pallida* [non Gassies]: Jeffreys, Brit. Conch. i, p. 21.
1873. *Pisidium bartolomaeum*, n. sp.: Clessin, Correspond.-Bl. zool.-min. Ver. Regensburg, xxvii, p. 68; *id.*, in Küster, Syst. Conch.-Cab. ix, abth. 3, Cycladeen, 1874, p. 31, pl. iii, f. 12-14.
1874. *Pisidium turanicum*, n. sp.: Clessin in Fedchenko, Izvyest. imp. Obshchest. Lyubit. Estestvoz. Antrop. i Etnogr. Moskva, xi, vuip. 1, p. 38, pl. iii, f. 34.

1875. ? *Pisidium tumidum*, Colbeau: Clessin in Küster, Syst. Conch.-Cab. ix, abth. 3, Cycladeen, p. 47, pl. v, f. 13-15.  
 1878. *Pisidium poulseni*, n. sp.: Clessin, Malakozool. Blätt. 1878, p. 124, pl. v, f. 6.  
 1898. ? *Pisidium costulatum*, n. sp.: Westerlund, Ann. Mus. Zool. Acad. imp. Sci. St. Petersb. 1898, p. 180.

Although as already mentioned examples of this well-marked form existed in Jenyns' collection, he unfortunately did not detect its specific distinctness, nor at a later date did Jeffreys, though there is reason to believe that it formed one element, and perhaps the principal one, of his composite *P. fontinale*. Its discovery in Britain was due to Dr. Johansen who pointed it out to me in 1901, and it was shortly afterwards placed on record (88, p. 17).

Malm's diagnosis (106, p. 92) is:—

“C. peroblique ovalis, ventricosa, tenuissime striata, nitidula; albida, zona inframediana fusca plerumque ornata; natibus convexis, umbonibus parum prominulis. Sipho longus gracilis, subconicus, truncatus.”

He further adds:—[Translation]

“This is . . . easily recognized by its oblique shell, which to the naked eye appears smooth. Its shape is a slightly compressed oviform. Shell thin and fragile. Curve of dorsal margin rather regular, though perceptibly straightened anteriorly where it merges into the somewhat narrowly rounded anterior margin. Curve of the ventral margin less convex than that of the cardinal but more sharply ascending towards the anterior as well as towards the posterior margin, which is also slightly convex, and in certain individuals presents inferiorly a not inconspicuous angle. There is a slightly perceptible obtuse angle where the dorsal margin passes into the somewhat rounded, steeply descending, subtruncate posterior margin.”

Save for the absence of appendiculae on the umbones it closely resembles *P. henslowanum* in external appearance. The hinge, however, differs in many respects as the following details show:—

*Hinge* (Pl. II, f. 3; III, f. 7) about  $\frac{3}{4}$  the length of the shell, strong, fairly wide, projecting well inwards, arcuate, more sharply curved posteriorly.

- R.V. *a. I.* about  $\frac{1}{3}$  the length of the hinge-line, narrow, strong, straight, inclined inwards; *base* very strong and swollen; *apex* nearly central, prominent, blunt-pointed; *ridges* somewhat sharp, distal descending at first very steeply, afterwards almost horizontal, umboinal sloping steeply to a lower level than the distal.  
*a. III.* nearly  $\frac{1}{3}$  the length of *a. I.*, narrow, apposed to the shell-margin; *apex* near the distal end, prominent,

- acuminate; *ridges* sharp, distal fairly steep, umbonal less so.
3. prominent, lamelliform, almost straight, slightly diagonal to the hinge-line.
  - p. I.* about  $\frac{1}{3}$  the length of the hinge-line, narrow, strong, straight; *base* strong, straight; *apex* towards distal side of centre, prominent, rounded-obtuse; *ridges* somewhat sharp, at first fairly steep, the distal the more so, then sloping away more gradually.
  - p. III.* about  $\frac{1}{2}$  the length of, and parallel to *p. I.*, straight, strong; *apex* near distal end, prominent, rounded-obtuse; *ridges* sharp, umbonal descending fairly gradually, distal very steeply.
- L.V. *a. II.* nearly  $\frac{1}{2}$  the length of the hinge-line, narrow, strong, straight; *base* strong and swollen; *apex* central, or towards umbonal side of centre, very prominent, acuminate, slightly distally directed; *ridges* somewhat sharp, distal descending at first very steeply, then almost horizontal, umbonal very steep and descending to lower than the distal.
2. prominent, bluntly triangular, erect, parallel with margin of hinge-plate; *base* continuous with that of *a. II.*
  4. lamelliform, sharp, flat-topped, anterior portion parallel with 2, posterior portion curving towards inner hinge-margin.
- p. II.* about  $\frac{1}{3}$  the length of the hinge-line, narrow, strong, straight, slightly outwardly directed; *base* strong; *apex* distal side of centre, distally directed, prominent, acuminate; *ridges* sharp, umbonal descending fairly straightly and gradually, distal very steep, especially at first.

*Dimensions.*—Malm's measurements are:—Long. 3·25, Alt. 2·6, Crass. 2 mm. An example from Baguley (Cheshire) in Mr. C. Oldham's collection is  $4 \times 3 \times 2\cdot25$  and one of his from Cemmaes (Anglesey) attains  $4\cdot25 \times 3\cdot5 \times 3$  mm.

Its most characteristic features are:—externally it is very inequilateral, in this respect resembling *P. henslowanum*, from inappendiculate examples of which it may be distinguished by its rounder umbones, as well as the details of its hinge, for the cardinals are practically parallel with the hinge-line and 2 & 4 with each other and 2 is round-pointed and directed outwards, whilst in *P. henslowanum* 2 is sharp-pointed and backwardly directed and all the cardinals are placed diagonally in respect to the hinge-plate. These same features of the cardinals and the fact that the apices of the laterals are further from the umbones than in *P. nitidum* distinguish even its rounded forms, from elongate individuals of the last named.

The species does not appear to have changed its characteristics from Cromerian times to the present day. Normally it is only

moderately swollen (Pl. XXII, f. 16) but frequently tends to become considerably so (Pl. XXII, f. 17). This latter feature is frequent in Irish specimens, which often attain a large size in localities where the associated species of the genus are undersized. One of the most elongate examples seen came from Salisbury (Pl. XXII, f. 2) and coming from running waters has the hinge strongly developed in contrast to those from quieter waters as Lochmaben (Pl. XXII, f. 8) and Bracebridge (Pl. XXII, f. 7), which are both less elongate and weak in the hinge, whilst examples from Rhosneigr (Anglesey) (Pl. XXII, f. 6) are comparatively round. Fossil examples from the Strand, Newbury, and from Gayfield, Edinburgh, have the umbones greatly developed, and so to a less extent has the figured recent specimen from Gloucester (Pl. XXII, f. 26).

## DISTRIBUTION.

SI

OI

NS CA

HB SS

S RW RE EL BF AN

WI EI PN AS

AM PM FF KI

M DN SG PC KF

CT RF LL ED HD

AY LA PE BW NN

WD ED LD AN WT KB DF SK RX SN

FE TY AR DO CU WL NY DM

WM SL LE MO IM ML MY EY

EM RO CV LH A SL WY SY LN

WG NB LF WH ME CR DB FT CH DY NM LS

SG KC KD DU MN MG SP ST LR CB WN EN

CL NT QC CW WI CD RA HF WO WW NO HU WS ES

NK LK ST KK WX PB CM BR GE OX BX BD HT NE

SK MC EC WA GM MM GW NW BK MX SE

WC NS SW NH SR WK EK

L ND SS DT SH WX EX

EG SD IW

SC WC

CI

*Pisidium subtruncatum.*

(Recent occurrences are shown in red; fossil occurrences by a line below the symbols. For the explanation of the symbols see p. 20.)

## RECENT.

## ENGLAND.

LONDON.—**L.**

Barnes [J. E. C.]; Catford [J. E. C.]; Ealing [W. M. W.]; Fulham Palace Moat [W. M. W.]; Hampstead [W. M. W.] [J. E. C.]; Hendon [J. E. C.]; Tottenham [W. M. W.].

BERKSHIRE.—**BK.**

Old Windsor [J. E. C.].

BUCKINGHAMSHIRE.—**BX.**

Boveney [J. E. C.]; Chesham [J. E. C.]; Eton [W. M. W.] Eton Wick [W. M. W.]; Halton [J. E. C.]; Iver [J. E. C.]; near Leighton Buzzard [J. E. C.]; Marsworth [C. O.]; near Uxbridge [J. E. C.]; Wendover Canal [C. O.]; Weston Turville [J. E. C.].

CAMBRIDGESHIRE.—**CB.** [Gray Coll., B.M. 1912.12.5: 49-55.]CHESHIRE.—**CH.**

Baguley [C. O.]; Birkenhead [E. R. S.]; Bickley [C. O.]; Budworth [A. S. K.]; Chelford [C. O.]; Pickmere [C. O.]; Sale Meadows [C. O.].

CUMBERLAND.—**CU.**

Blaithwaite [J. L.]; Bassenthwaite [W. J. F.]; nr. Carlisle (?) [J. L.].

DEVONSHIRE, NORTH.—**ND.**

Braunton [J. L.]; Morthoe district [J. L.].

DURHAM.—**DM.**

Mainsforth [B.M. 1911.10.26: 7929-30].

ESSEX, NORTH.—**NE.**

Bay Mill (Colchester ?) [W. M. W.].

ESSEX, SOUTH.—**SE.**

Buckhurst Hill (R. Roding) [J. E. C.]; Chelmsford (R. Cann) [W. M. W.].

GLOUCESTERSHIRE, EAST.—**GE.**

Gloucester [W. M. W.].

HAMPSHIRE, SOUTH.—**SH.**

R. Itchen, Southampton [B.M. 1911.10.26: 7766-72].

HERTFORDSHIRE.—**HT.**

Aldenham [C. O.]; Ashridge [C. O.]; Broxbourne [J. E. C.]; Marsworth Reservoir [C. O.]; Rickmansworth [C. O.]; St. Albans (R. Ver) [C. O.]; Totteridge [J. E. C.].

KENT, EAST.—**EK.**

Medway, R. [A. S. K.].

KENT, WEST.—**WK.**

Medway, R. [A. S. K.]; Plumstead [A. S. K.].

LANCASHIRE, SOUTH.—**SL.**

Southport [E. R. S.] [T. R.]; Tarleton [J. W. J.].

LEICESTERSHIRE.—**LR.**

Aylestone [C. O.]; Glenfield [C. O.]; Staverton [A. S. K.].

LINCOLNSHIRE, NORTH.—**LN.**

Caistor (Croxby Pond) [C. S. C.]; Haugham (Skirbeck) [C. S. C.]; Louth Canal [C. S. C.]; Raithby [C. S.]; South Kelsey [C. S. C.]; Tathwell [C. S. C.].

**MIDDLESEX.—MX.**

Bedfont [J. E. C.]; Bushey Park [J. E. C.]; Colnbrook [J. E. C.]; Edgeware [J. E. C.]; Harefield [C. O.] [J. E. C.]; Uxbridge [J. E. C.]; West Drayton [W. M. W.] [J. E. C.].

**NORFOLK, WEST.—WN.**

Hunstanton [J. E. C.].

**NOTTINGHAMSHIRE.—NM.**

Hoveringham [C. O.]; Nottingham (Canal) [C. O.].

**OXFORDSHIRE.—OX.**

Oxford [H. C. N.].

**SHROPSHIRE.—SP.**

Bridgnorth [E. C.].

**SOMERSETSHIRE, NORTH.—NS.**

Glastonbury [H. C.]; Kenn Moor [B.M. 1911. 10. 26: 7749-51]; Walton Moor [B.M. 53.12.6: 32-41 *pars* & 1911. 10. 26: 7730-36].

**STAFFORDSHIRE.—ST.**

Barlaston [C. O.]; Cannock Chase [H. O.]; Himley [H. O.]; Stafford (Canal) [E. C.]; Wightwick, Wolverhampton (Canal) [H. O.]; Willenhall [H. O.].

**SUFFOLK, WEST.—WS.**

Mildenhall [A. M.].

**SURREY.—SR.**

Byfleet [W. M. W.]; Chertsey Mead [B. B. W.]; Kew to Richmond [W. M. W.]; Ranmore Common [A. S. K.].

**WARWICKSHIRE.—WW.**

Sutton Coldfield district [H. O.] [W. M. W.].

**WILTSHIRE, SOUTH.—SW.**

Salisbury [B. B. W.].

**WORCESTERSHIRE.—WO.**

Worcester [C. O.]; Yardley Wood [H. O.].

**YORKSHIRE, MID-WEST.—MY.**

York [B.M. 40.10.9: 41-46].

**YORKSHIRE, NORTH-EAST.—EY.**

Scarborough [Camb.]; York [B.M. 40.10.9: 41-46].

**YORKSHIRE, SOUTH-EAST.—SY.**

York [B.M. 40.10.9: 41-46].

**ISLE OF MAN.—IM.**

Near Ballaugh [F. T.].

**ISLE OF WIGHT.—IW.**

Sandown [H. C. N.].

**WALES.****ANGLESEY.—A.**

Cemmaes [C. O.] [J. E. C.]; Gaerwen [J. E. C.]; Holland Arms [J. E. C.]; Pentraeth [J. E. C.]; Rhosneigr [J. E. C.].

**CARMARTHENSHIRE.—CM.**

Pendine [W. M. W.].

**CARNARVONSHIRE.—CR.**

Llanrhychwyn (Reservoir 700') [C. O.].

**MERIONETHSHIRE.—MN.**

Aberdovey [J. E. C.] ; Bala Lake, from stomach of a Gwyniad (*Coregonus pennantii*) [Sir W. Jardine, B.M.1912.12.5 : 59–61].

**PEMBROKESHIRE.—PB.**

Manorbier [A. S. K.] ; Tenby [W. M. W.] [C. S.] [J. E. C.].

**CHANNEL ISLANDS.—CI.**

Guernsey [J. E. C.].

**SCOTLAND.****BUTE, &c.—B.**

L. Fad [A. W. S.].

**DUMFRIES.—DF.**

Lochmaben [A. S. K.].

**WIGTONSHIRE.—WT.**

Whithorn [E. C.].

**IRELAND.****ANTRIM.—AN.**

Autrim (Six-Mile-Water) [D. M.] [J. N. M.] ; Belfast [C. O.] [W. M. W.] ; Dhu, L., Sallagh Braes (1100') [A. W. S.] ; Drum Bridge [J. N. M.] ; Kilcorrig [J. N. M.] ; Lagan Canal (2nd Lock) [J. N. M.] ; Neagh, L. [C. O.] ; Woodburn Dam [A. S. K.].

**CARLOW.—CW.**

Tinnahinch [R. A. P.].

**CORK, EAST.—EC.**

Cork [W. M. W.].

**CORK, MID.—MC.**

Cork [W. M. W.] ; Cork Park [R. A. P.] [A. S. K.].

**DONEGAL, EAST.—ED.**

Acapple, L. [H. T.] ; Portmore [D. M.] ; Roshin, L. [H. T.] ; Vearty, L. [H. T.].

**DONEGAL, WEST.—WD.**

Fern, L. [J. N. M.] ; Melmore, L. [A. W. S.] ; More, L. [A. W. S.] ; Rosapenna [J. N. M.].

**DOWN.—DO.**

Comber [J. N. M.] ; Drum Bridge [J. N. M.] ; Lagan (Canal 2nd Lock) [J. N. M.] ; Loughinisland [D. M.] ; Newtonards [J. N. M.] ; Portavoe [D. M.] ; Saintfield [J. N. M.].

**DUBLIN.—DU.**

Lambay [A. W. S.].

**FERMANAGH.—FE.**

Anlaban, L. [H. T.] ; Bigwood (Rules Pond) [H. T.] ; Enniskillen [A. S. K.] ; Nafeola, L. [H. T.] ; Shean North, L. [H. T.] ; Tully Lough [H. T.] ; Tullylough More [H. T.] ; Vearty, L. [H. T.].

**GALWAY, NORTH.—NG.**

Ballindoolig [R. A. P.].

**GALWAY, SOUTH.—SG.**

Ballinasloe [R. A. P.] ; Kilmacduagh [R. A. P.] ; Portumna [R. A. P.] ; Rea, L. [R. A. P.] ; Tallanafrankagh, L. [R. A. P.].

**GALWAY, WEST.—WG.**

Callow, L. [D. M.] ; Inishbofin [A. W. S.].

**KERRY, SOUTH.—SK.**

Gill, L., near Stradbally [A. W. S.]

**LONDONDERRY.—LD.**

Magilligan [D. M.]

**MAYO, WEST.—WM.**

Achill, I. [A. W. S.]; Bunnamucka, L., near Newport [A. C. S.]

Clare, I. [A. W. S.]; S.W. Mayo [A. W. S.]

**MONAGHAN.—MO.**

Glasslough [D. M.]; Ross, L. [J. N. M.]

**QUEEN'S COUNTY.—QC.**

Rathdowney [R. A. P.]

**SLIGO.—SL.**

Pullagheeny [D. M.]

**TIPPERARY, NORTH.—NT.**

Cloughjordan [R. A. P.]; Finnoe [D. M.]

**TIPPERARY, SOUTH.—ST.**

Thurles [R. A. P.]

**TYRONE.—TY.**

Roughan, L. [J. N. M.]

**WATERFORD.—WA.**

Near Waterford [A. W. S.]

**WEXFORD.—WX.**

Enniscorthy [R. A. P.]; Wexford [R. A. P.]

**FOSSIL.****HOLOCENE.****LONDON.—L.**

Chingford [A. S. K.]; Fulham (Betteridge Rd.) [B. B. W.]; New Scotland Yard [B. B. W.]; Shand Street (Bed B) [A. S. K.]; London County Council Hall, Westminster Bridge Road [A. S. K.]; Lea Valley [A. S. K.] [B.M.—L. 6750 *pars* & 10037]; Westminster [B.M.—L. 7565 *pars*].

**BERKSHIRE.—BK.**

Newbury [A. S. K. & B. B. W.] [B. M.—L. 7934].

**BUCKINGHAMSHIRE.—BX.**

Boveney [J. E. C.]

**ESSEX, SOUTH.—SE.**

Ilford [A. S. K.]

**GLOUCESTERSHIRE, WEST.—GW.**

Westbury-on-Severn [A. S. K.]

**HUNTINGDONSHIRE.—HU.**

St. Ives [A. S. K.]

**MIDDLESEX.—MX.**

Thames Alluvium between Walton and Shepperton [B. B. W.]

**OXFORDSHIRE.—OX.**

Clifton-Hampden (Beds B & C) [A. S. K.]

**SUFFOLK, EAST.—ES.**

Blythburgh [A. S. K.]

**SURREY.—SR.**

Near Staines [A. S. K.]

## SCOTLAND.

## EDINBURGH.—ED.

Edinburgh (Gayfield) [M. P. G.].

## IRELAND.

## CLARE.—CL.

Inchiquin, L. [A. S. K.].

## DOWN.—DO.

Ballyfinder? [A. S. K.].

## FERMANAGH.—FE.

Kilnamadoo [A. S. K.].

## GALWAY, NORTH.—NG.

Menlough [A. S. K.].

## GALWAY, SOUTH.—SG.

Ballinasloe [R. A. P.].

## MEATH.—ME.

Kells [A. S. K.]; Mentrim, L. [A. S. K.].

## AGE DOUBTFUL.

## BUCKINGHAMSHIRE.—BX.

Princes Risborough [Prestwich Coll., B.M.—L. 23956].

## CAMBRIDGESHIRE.—CB.

Chatteris [Prestwich Coll., B.M.—L. 23952].

## SUFFOLK, EAST.—ES.

Sproughton [Prestwich Coll., B.M.—L. 23979 &amp; 23983].

## PLEISTOCENE.

## LONDON.—L.

Angel Road, Tottenham (Glacial) [A. S. K.].

## BEDFORDSHIRE.—BD.

Biddenham [Prestwich Coll.: B.M.—L. 23961].

## CAMBRIDGESHIRE.—CB.

Barnwell [A. S. K.] [B.M. 5709 & 14933]; Barrington [B.M.—L. 5712 *pars*] [A. S. K.].

## ESSEX, NORTH.—NE.

Clacton [A. S. K. &amp; B. B. W.].

## ESSEX, SOUTH.—SE.

Grays [A. S. K.]; Ilford [A. S. K.].

## HUNTINGDONSHIRE.—HU.

Woodstone [C. E. Y. K.].

## KENT, WEST.—WK.

Crayford-Erith [B. B. W.] [B.M.—L. 6690 *pars*, 6709, & 19664-5 *pars*]; Swanscombe [A. S. K. & B. B. W.].

## NORTHAMPTONSHIRE.—NO.

Overton Longville [Prestwich Coll., B.M.—23967].

## SUFFOLK EAST.—ES.

Hoxne [M. P. G. 25706]; Stutton [A. S. K.].

## SUSSEX, WEST.—WX.

West Wittering [A. S. K.].

## WORCESTERSHIRE.—WO.

Birlingham [A. S. K.].

## CROMERIAN.

NORFOLK, EAST.—EN.

West Runton [A. S. K.]. [N. M.]

The Continental range of this species is probably Europe north of the Alps. It certainly occurs in Scandinavia [Lynge Coll.], France and Transylvania [Norman Coll., B.M. 98.5.29 : 22170-83 *pars* & 22444-55 *pars*], Russia [Lindholm Coll.], and has been received from Lake Baikal labelled *P. mucronatum*.

It has been found in the Holocene and Pleistocene of Denmark [Johansen (85, p. 9)]; in the Pleistocene (Campinien) of Brussels [Mus. Hist. Nat. Brussels].

10. ***Pisidium henslowanum*** (Sheppard).

[Pls. II, f. 4; III, f. 9; XXIII, f. 21-31; XXIV; XXV, f. 13; XXVI, f. 13.]

- 1825. *Tellina henslowana*, Leach MS. : Sheppard, Trans. Linn. Soc. xiv, p. 150.
- 1831. *Cyclas appendiculata*, Leach MS. : Turton, Manual, p. 15, f. 6.
- 1832. *Pisidium henslowianum*, nobis : Jenyns, Trans. Camb. Phil. Soc. iv, p. 308, pl. xxi, ff. 6 & 7.
- 1852. *Pera appendiculata* : Leach, Moll. Brit. Synop. p. 292.
- 1854. *Pisum henslowianum*, Shepp. : Deshayes, Cat. Conch. Brit. Mus. ii, p. 278.
- 1855. *Pisidium henslowianum*, var. *nucleus* ("non appendiculée") : *id.*, tom. cit. p. 347.
- 1858. *Musculium henslowianum*, Shepp. : Adams, Gen. Rec. Moll. ii, p. 451.
- 1859. *Pisidium henslowianum* : Jeffreys, Ann. & Mag. Nat. Hist. III, iii, p. 37.
- 1862. *Pisidium fontinale*, var. *henslowana* : Jeffreys, Brit. Conch. i, p. 21.
- 1903. *Corneocyclas (Tropidocyclas) henslowianum*, Shepp. : Dall, Proc. Biol. Soc. Washington, xvi, p. 7.

Sheppard first received this very characteristic shell from Leach under the name of *Pera henslowana* after its discoverer Prof. J. S. Henslow. Leach afterwards seems to have changed the name to *Pera appendiculata*, transferring the former specific designation to a form of *Pisidium amnicum*.

Sheppard, however, described the shell under the name he had received with it as follows (163, p. 150) :—

"T. [= *Tellina*] testa oblique subovata transversim vix sulcata, projecturâ a basi umbonis adornata.

*Habitat* in rivis.

Testa 2 lin. longa [= alt.],  $2\frac{1}{2}$  lin. lata [= long.], cornei coloris, glabra, striata, vix sulcata, anteriùs planiuscula.

I first received this species from Dr. Leach, and a very distinct one it is . . . its decisive characteristic arises from a curious eave-like projection at the bases of the *umbones*."

Jenyns, who introduced a superfluous "i" into the specific name, gave a fuller diagnosis (83, p. 308), which is here reproduced:—

"*Testa* obliquè ovalis, ventricosa, anticè planiuscula, distinctè inæquilateralis, tenuiter striata, nitidè lutescenti-alba, vel cornea, saepius partim præcipue ad apicem, sorde ferrugineâ obtecta: umbones acutiusculi, projecturâ parvâ lamelliformi adornatis.

*Obs.* In pullis projectura medio valvularum insidet; hinc gradatim assurgit, accrescente testâ."

To this it is now necessary to add the details concerning the hinge characters:—

*Hinge* (Pl. II, f. 4; III, f. 9) about  $\frac{3}{4}$  the length of the shell, not very strong, fairly wide, projecting well inwards, gently curved.

R.V. *a. I.* long, nearly  $\frac{1}{2}$  the length of the hinge-line, narrow and straight; *base* strong, slightly swollen; *apex* central, scarcely prominent, pointed-obtuse; *ridges* rounded, about equally steep, the umbonal descending a little the lower.

*a. III.* about  $\frac{1}{3}$  the length of *a. I.*, narrow, somewhat apposed to the shell-margin; *apex* near distal end, obtuse-pointed; *ridges* slightly rounded, distal short and steep, umbonal long and gradual, tending to coalesce towards the umbo with that of *a. I.*

3. prominent, narrow, arcuate; *a* thin, sharp, parallel to shell-margin; *b* thickening and curving down to the inner margin of the hinge-plate, sulcate.

*p. I.* about  $\frac{1}{3}$  the length of the hinge-line, narrow, fairly straight; *base* strong and swollen; *apex* central, scarcely prominent, extremely obtuse; *ridges* round-edged, sloping about equally and fairly gradually.

*p. III.* about  $\frac{1}{2}$  the length of *p. I.*, slight, narrow, straight, distinct; *apex* distal side of centre, prominent; *ridges* fairly sharp, umbonal gradually, distal steeply sloping.

L.V. *a. II.* nearly  $\frac{1}{2}$  the length of the hinge-line, narrow, straight; *base* strong, slightly swollen; *apex* central, prominent, round-pointed; *ridges* rounded, descending about equally, steeply at first then more gradually.

2. prominent, obtusely triangular, apex backwardly directed, base continuous with that of *a. II.*

4. thin lamelliform, slightly arcuate, curving round 2 from a point near the shell-margin anterior to the umbo to half-way across the hinge-plate on the posterior side.

*p. II.* about  $\frac{1}{3}$  the length of the hinge-line, narrow, curving with the shell-margin; *base* strong and straight; *apex*

towards the distal end, fairly prominent, acuminate; ridges sharp, umbonal descending gradually, distal very steeply at first, then very gradually,

*Dimensions*.—Sheppard's measurements give, when translated into millimetres: Long. 5, Alt. 4 mm. Jenyns gives the same, but adds, Crass. 3·5 mm. A specimen from the Red Bridge Pond, Hampstead Heath (London), is  $5\cdot1 \times 4 \times 3\cdot4$ , and one in Mr. Oldham's collection from Baguley (Cheshire)  $6 \times 5 \times 4$ , but these are surpassed by one received from Herr Lynge from Lyngby-Bagsvær Sø, Sealand, which attains  $6\cdot6 \times 5\cdot8 \times 4\cdot6$  mm. (Pl. XXIV, f. 5).

In very young shells the appendiculae of course appear well back on the valve (Pl. XXIII, f. 25; 29 c, d) and only with growth become relatively apical. Not infrequently these appendiculae are wanting, when the shell closely resembles *P. subtruncatum*: the best examples are those from Preston (Lancs.) [B.M. 1913.1.1: 1-9]. It may, however, be distinguished by the sharper umbones, by the fact that the cardinal 3 of the right valve is more curved and its posterior limb, b, more sulcate; whilst the cardinals 2 & 4 of the left valve are diagonal rather than parallel to the hinge-line, and 2 is sharply pointed instead of rounded.

An interesting form is met with in the Pleistocene deposits of Grays and Crayford-Erith in which the shell is more trigonal in shape and much thicker and heavier in the hinge than the typical form (Pl. XXV, f. 13 & XXVI, f. 13). At first sight, indeed, it seems difficult to separate it from the associated *P. supinum*. Its anterior lateral teeth, however, are proportionately longer and *a. i.* is not so inwardly directed, nor is the cardinal 3 so sharply flexed; whilst in the left valve the apex of the cardinal 2 points more backward and 4 curves further forward over the apex of 2. The *P. supinum*, moreover, is more truncate posteriorly, the more sharply triangular cardinal 2 points directly outwards, and its edges show traces of folding back, and 4 does not reach forwards over the apex of 2, whilst the fissure between 2 & 4 crosses the hinge-plate at a higher angle. More normal forms from Crayford-Erith are shown on Pls. XXIII, f. 29 & XXIV, f. 8 & 9. In the Crayford-Erith beds *P. henslowanum* is by far the commoner, *P. supinum* being comparatively scarce. At Grays, on the other hand, the latter is the abundant form, outnumbering the former by about 4 to 1. Except in the instance just described, the species shows no variation beyond the average from Cromerian to recent days. The single valve from the Coralline Crag is too immature to admit of comparison. Specimens from Hampstead (Pl. XXIII, f. 27) show the normal amount of inflation, those from Baguley (Pl. XXIII, f. 28) are the most swollen. The former may also be taken as examples of the average form (Pl. XXIV, f. 7). Those from the Thames (Pl. XXIV, f. 2) show the strengthening of the hinge consequent on their having to contend with strongly flowing

water; also they show greater development of the umbo. The most oval examples (Pl. XXIV, f. 1) are from Blythburgh.

The specimen figured by Forbes & Hanley (63, pl. xxxvii, f. 11) is one of those in the British Museum Collection (1907.12.30: 159-61).

## DISTRIBUTION.

SI

OI

		NS	CA
HB		SS	
S	RW RE EL BF AN		
	WI EI PN AS		
M	AM PM FF KI		
I	DN SG PC KF		
CT	B RF LL ED HD		
	AY LA PE BW NN		
WD ED LD AN	WT KB DF SK RX SN		
FE TY AR DO	CU WL NY DM		
WM SL LE MD	IM	ML MY EY	
EM RO CV LH		SL WY SY LN	
WG NG LF WH ME	A CR DB FT	CH DY NM LS	
SG KC KD DU		MN MG SP ST LR CB WN EN	
CL NT QC CW WI		CD RA HF WO WW NO HU WS ES	
NK LK ST KK WX	PB CM BR GE	DX BX BD HT NE	
SK MC EC WA	GM MM GW NW BK	MX SE	
WC	L	NS SW NH SR WK EK	
	ND SS DT SH WX EX		
	EC SD	IW	
SC WC			

CI

### *Pisidium henslowanum.*

(Recent occurrences are shown in red: fossil occurrences by a line below the symbols. For the explanation of the symbols see p. 20.)

## RECENT.

## ENGLAND.

### LONDON.—L.

Acton [J. E. C.]; Hampstead [W. M. W.]; Tottenham [W. M. W.].

### BERKSHIRE.—BK.

Eton (R. Thames) [J. E. C.].

**BUCKINGHAMSHIRE.—BX.**

Eton (R. Thames) [J. E. C.]; Halton Canal [J. E. C.]; Iver [J. E. C.]; near Leighton Buzzard [J. E. C.]; Marsworth [C. O.]; Wendover Canal [C. O.].

**CAMBRIDGESHIRE.—CB.** [Gray Coll., B.M. 1912. 12. 5 : 43-47.]**CHESTER.—CH.**

Baguley [C. O.]; Bickley [C. O.]; Brooklands [C. O.]; Budworth [A. S. K.]; Handforth [C. O.]; Marple (Canal) [C. O.]; Mere [C. O.]; Ringway [E. R. S.] [C. S.].

**DEVONSHIRE, SOUTH.—SD.**

Newton Abbot district [B. B. W.].

**DURHAM.—DM.**

Cockerton [C. O.].

**ESSEX, SOUTH.—SE.**

Navestock [W. M. W.].

**HAMPSHIRE, SOUTH.—SH.**

Hambledon [W. M. W.]; Hoe Moor [J. E. C.]; R. Itchen, Southampton [B.M. 1911. 10. 26 : 7646-62].

**HERTFORDSHIRE.—HT.**

Aldenham [C. O.]; Berkhamstead [C. O.]; Rickmansworth [C. O.].

**KENT, EAST & WEST.—EK. & WK.**

Medway R. [A. S. K.].

**LANCASHIRE, MID.—ML.**

Preston [B.M. 1913. 1. 1 : 1-9].

**LANCASHIRE, SOUTH.—SL.**

Tarleton [J. W. J.].

**LEICESTERSHIRE.—LR.**

Aylestone [C. O.].

**LINCOLNSHIRE, NORTH.—LN.**

Appleby [C. S. C.].

**MIDDLESEX.—MX.**

Bedfont [J. E. C.]; Bushey Park [J. E. C.]; Thames [J. E. C.]; West Drayton [W. M. W.].

**NORTHAMPTONSHIRE.—NO.**

Blisworth [C. O.].

**NOTTINGHAMSHIRE.—NM.**

Nottingham [C. O.].

**OXFORDSHIRE.—OX.**

Rejectamenta of R. Cherwell, Oxford [H. C. N.].

**STAFFORDSHIRE.—ST.**

Barlaston [C. O.]; Cannock Chase [H. O.]; near Walsall [H. O.]; Wightwick, Wolverhampton (Canal) [H. O.].

**SUFFOLK, EAST.—ES.**

Blythburgh [A. S. K.]; Needham Market [A. M.].

**SUFFOLK, WEST.—WS.**

Mildenhall [A. M.].

**SURREY.—SR.**

Byfleet [W. M. W.] [J. E. C.]; Ranmore Common [A. S. K.]; Thames [J. E. C.].

**WARWICKSHIRE.—WW.**

Olton (Canal) [H. O.]; Solihull [C. O.]; Sutton Coldfield district [H. O.].

**WILTSHERE, SOUTH.—SW.**

Salisbury [B. B. W.].

**YORKSHIRE, MID-WEST.—MY.**

Ripon (?) [J. E. C.].

**WALES.****GLAMORGAN.—GM.**

Swansea [Camb.].

**IRELAND.****DONEGAL, WEST.—WD.**

Melmore, L. [A. W. S.].

**GALWAY, SOUTH.—SG.**

Ballinasloe [R. A. P.].

**TIPPERARY, NORTH.—NT.**

Finnoe [D. M.].

**FOSSIL.****HOLOCENE.****LONDON.—L.**

Chingford [A. S. K.]; Fulham (Betteridge Rd.) [B. B. W.]; New Scotland Yard [B. B. W.]; Lea Valley [J. E. C.] [A. S. K.]; Lea Valley Alluvial [A. S. K.]; West India Docks [M. P. G.]; Westminster [B.M.—L. 7568 *pars*].

**BERKSHIRE.—BK.**

Newbury (The Strand) [A. S. K.]; Wallingford (Beds A & B) [A. S. K.].

**ESSEX, SOUTH.—SE.**

Dagenham [A. S. K.]; Ilford [A. S. K.].

**HUNTINGDONSHIRE.—HU.**

St. Ives [A. S. K.].

**KENT, WEST.—WK.**

Crossness [B.M.—L. 6719].

**MIDDLESEX.—MX.**

Thames Alluvium between Walton & Shepperton [B. B. W.]; Uxbridge [A. S. K.].

**OXFORDSHIRE.—OX.**

Clifton-Hampden (Beds A, B & C) [A. S. K.]; Wargrave [A. S. K.].

**SUFFOLK, WEST.—WS.**

Knettishall [A. S. K.].

**SURREY.—SR.**

Near Staines [A. S. K.].

**AGE DOUBTFUL.****CAMBRIDGESHIRE.—CB.**

Chatteris [Prestwich Coll., B.M.—L. 23950].

**SUFFOLK, EAST.—ES.**

Sproughton [Prestwich Coll., B.M.—L. 23978 & 23982].

## PLEISTOCENE.

LONDON.—**L.**

Angel Road, Tottenham (Glacial) [A. S. K.]; Hackney [B. B. W.]; N.E. London [B.M.—L. 5804 *pars*]; Shacklewell Lane [Prestwich Coll., B.M.—L. 23973].

BEDFORDSHIRE.—**BD.**

Biddenham [Prestwich Coll., B.M.—L. 23960]; Kempston [B.M.—L. 18611].

CAMBRIDGESHIRE.—**CB.**

Barnwell [A. S. K.] [B.M.—L. 5707 & 14932].

ESSEX, NORTH.—**NE.**

Clacton [A. S. K. & B. B. W.] [B.M.—L. 6686] [M. P. G.].

ESSEX, SOUTH.—**SE.**

Grays [A. S. K. & B. B. W.] [B.M.—L. 6695]; Ilford [A. S. K.] [B.M.—L. 6700 *pars*].

HUNTINGDONSHIRE.—**HU.**

Woodstone [C. E. Y. K.].

KENT, WEST.—**WK.**

Crayford-Erith [A. S. K. & B. B. W.] [B.M.—L. 6690 & 19664-5 *pars*] [M. P. G.]; Swanscombe [A. S. K. & B. B. W.].

MIDDLESEX.—**MX.**

Brentford [B.M.—L. 7637 *pars*].

NORTHAMPTONSHIRE.—**NO.**

Overton Longville [Prestwich Coll., B.M.—L. 23966].

SUFFOLK, EAST.—**ES.**

Stutton [A. S. K.].

WILTSHIRE, SOUTH.—**SW.**

Fisherton [B.M.—L. 6716].

WORCESTERSHIRE.—**WO.**

Birlingham, near Pershore [A. S. K.].

## CROMERIAN.

NORFOLK, EAST.—**EN.**

Sidestrand [M. P. G.]; Trimingham [M. P. G.]; West Runton [A. S. K. & B. B. W.] [N. M.] [M. P. G.].

## CORALLINE CRAG.

SUFFOLK, EAST.—**ES.**

Sutton [R. Bell Coll., B.M.—L. 7343].

*P. henslowanum* is known from Scandinavia [Lynge Coll.], France and Germany [Norman Coll., B.M. 98.5.20: 22204-16 & 22221-2], Russia [Lindholm Coll.], and probably occurs throughout Europe north of the Alps. A specimen was also obtained from Lake Baikal [Lindholm Coll.].

As a fossil it is found in post-glacial deposits at Toppeladergard, Sweden [Prof. G. E. Wright Coll.]; in the Holocene and Pleistocene

of Denmark [Johansen (85, p. 9)]; in the Pleistocene (Campinien) of Courtrai, Belgium [Mus. Hist. Nat. Brussels]; and in the Pleistocene (Mosbacher Sand) of Mauer (near Heidelberg) [Geyer (69, p. 96)].

### 11. **Pisidium supinum**, A. Schmidt.

[Pls. II, f. 5; IV, f. 7; XXV; XXVI; XXVII, f. 1 & 2.]

1850. *Pisidium supinum*, n. sp.: Schmidt, Zeitschr. f. Malakozool. vii, p. 119.  
 1855. *Pisidium jaudouinianum*, nob.: Gassies, Actes Soc. Linn. Bordeaux, xx, p. 345, pl. ii, f. 2.  
 — *Pisidium bonnafouxianum*, P. de Cess.: Cessac, Bull. Soc. Sci. Nat. La Creuse, ii, p. 76. [For fig. see Baudon, Mém. Soc. Acad. Oise, iii, 1857, pl. iv, f. 1.]  
 — *Pisidium henslowianum*, Shepp. [pars]: Malm, Götheborgs K. Vet. & Vitt. Samh. Handl. iii, p. 95.  
 1856. *Pisidium henslowianum*, ♂. *bonnafourianum* and ♀. *jaudonianum*: Moquin-Tandon, Hist. Nat. Moll. France, ii, p. 581.  
 1857. *Pisidium conicum*, nobis: Baudon, Mém. Soc. Acad. Oise, iii, p. 362, pl. v, figs. B, B, B, B.  
 1858. *Musculium supinum*, Schmidt: Adams, Gen. Rec. Moll. ii, p. 452.  
 — *Pisidium supinum*, Schmidt: id., tom. cit. p. 660.  
 1866. ? *Pisidium moitessierianum* [n. sp.]: Paladilhe, Rev. et Mag. Zool. xviii, p. 172.  
 1870. *Pisidium henslowianum*, var. β. *supinum* [sic], A. Schmidt: Kreglinger, Syst. Verzeich. Deutsch. Binnen-Moll. p. 357.  
 1871. *Pisidium henslowianum*, var. β. *normale* [sic]: Westerlund, Nova Acta R. Acad. Sci. Upsala, iii. viii, no. 1, p. 158.  
 1872. *Pisidium baudonii*, n. sp.: Clessin, Malakozool. Blätter. xx, p. 83, pl. iv, f. 1.  
 1890. *Pisidium casertanum*, vars. *bonnafouxianum* & *jaudouinianum* [sic]: Westerlund, Fauna paläarct. Region, vii, pp. 28 & 29.  
 1893. *Pisidium trigonum*, n. sp.: Bourguignat in Locard, Coquil. Eaux douces France, p. 148.  
 1903. *Pisidium supinoide*, n. sp.: Clessin in Futterer, Durch Asien, iii, p. 81.

A very well-marked species, so that its quite recent recognition in these Islands is remarkable. It was first pointed out by Dr. A. C. Johansen, who in 1901 found dead specimens in the muddy foreshore of the Thames at low-water near Kew Gardens. It was speedily detected first in the Lea Alluvium at Walthamstow (88, p. 17 & 20) and then in most of the post-pliocene deposits of the London district. Later a specimen that had been taken alive at Battersea was found in Dr. J. E. Gray's collection at the Natural History Museum (1906. 6. 18 : 6-9) on a tablet with examples of *P. obtusale* (1906. 6. 18 : 1-4) and labelled "Pera gibba"; but it was not until 1909, when specimens that had been taken by Mr. J. E. Cooper in the Thames at Twickenham and Hampton Wick were identified (44, p. 231), that it was definitely added to the British Fauna.

Schmidt's original description (156, p. 119) is as follows :—

“ Vorder- und Hinterseite des Oberrandes stossen in den Wirbeln recht-, ja selbst spitzwinklig zusammen ; auf den Wirbeln befindet sich eine scharfe Runzel ; das kurze Ligament springt deutlich vor ; Schlosszähne unverhältnissmässig dick ; dabei ist die kleine Muschel so bauchig und der Vorderrand so weit vorgestreckt, dass sie sich gern auf das Vorderende des Rückens legt und den scharfen Unterrand emporkehrt—deshalb nenne ich sie *Pis. supinum*. ”

He adds a little later that the appendiculæ on the umbones are not always present.

Baudon's diagnosis (9, p. 362) being yet clearer we append it :—

“ Concha triangularis, obliqua; alta, convexa ad umbones, solida, subopaca, tenuiter striata, superius conica, inferius arcuata, antice rostrata, postice vix subeurvata, pallida, corneo lutea vel flavescentia; apicibus subacutis lamellâ superatis; ligamento brevi, linearis, flavidus; commissurâ crassissimâ, præsertim quoquaversus et undique crenulatâ; duobus dentibus cardinalibus, tuberculosis, vix conspicuis.”

He has, however, mistaken the characters of the hinge-teeth, the details of which are as under :—

*Hinge* (Pl. II, f. 5; IV, f. 7) nearly  $\frac{3}{4}$  the length of the shell, massive, projecting well inwards, strongly arched with two flexures.

R.V. *a. I.* about  $\frac{1}{3}$  the length of the hinge-line, very stout, curving sharply inwards; *base* exceedingly deep, solid and swollen; *apex* near distal end, moderately prominent, rounded obtuse; *ridges* very round, sloping about equally and fairly steeply.

*a. III.* about  $\frac{1}{2}$  the length of *a. I.*, from which it is separated by a deep fossa; somewhat apposed to the shell-margin: *apex* on distal side of centre, not very prominent: *ridges* rounded, distal short and steep, umbonal longer and less steep.

*b.* scarcely prominent, narrow, arcuate; *a* nearly parallel to the shell-margin, *b* curving diagonally to the inner margin of the hinge-plate.

*p. I.* length about  $\frac{1}{4}$  that of hinge-line, very strong, narrow, slightly curving inwards; *base* strong, swollen; *apex* distal side of centre, scarcely prominent, very obtusely acuminate; *ridges* not much rounded, umbonal long and gradually sloping, distal short, at first nearly vertical, then sloping gently.

*p. III.* not quite  $\frac{1}{2}$  the length of *p. I.*, narrow, somewhat apposed to the shell-margin; *apex* near distal end;

*ridges* rounded, umbonal sloping gradually, distal steeply.

- L.V. *a. II.* about  $\frac{1}{3}$  the length of the hinge-line, very stout, straight (but occasionally strongly deflected inwards); *base* very deep, strong and swollen; *apex* distal side of centre, very prominent, rounded obtuse, distally directed; *ridges* somewhat rounded, distal sloping at first very steeply, then gradually, umbonal steeply.
2. prominent, triangular, base continuous with that of *a. II.*, apex sharp-pointed, directed outwards and backwards towards the umbo.
4. lamelliform, sharp, traversing nearly the whole width of the hinge-plate diagonally from the umbo, parallel to the posterior side of 2.
- p. II.* about  $\frac{1}{3}$  the length of the hinge-line, stout, straight, or with slight inward curvature; *base* very deep, strong and swollen; *apex* distal side of centre, very prominent, rounded acuminate, distally directed; *ridges* rounded, umbonal long, gradually sloping down to a lower level than the distal, distal at first nearly vertical, then gently sloping.

*Dimensions.*—Schmidt's measurements translated into millimetres are:—Long. 4·5, Alt. 3·9, Crass. 3·3. Baudon gives 5 to 6  $\times$  5 to 6  $\times$  3 to 3·5. The largest recent British specimens are from the Thames at Eton 4·2  $\times$  4·8  $\times$  2·7 and Budworth Mere (Cheshire) 4·2  $\times$  3·5  $\times$  3·4, whilst a single valve from the Pleistocene at Grays is 4·6  $\times$  4·6  $\times$  2.

On the whole this species is very distinct, the strong, characteristic hinge and trigonal form, even when the appendiculae are not developed, sharply distinguishing it from its congeners ever since Cromerian times (Pl. XXV, f. 14; XXVI, f. 9 & 10) down to the present day (Pl. XXV, f. 11; XXVI, f. 1).

Sometimes, especially in the young stages, it assumes a more rounded form (Pl. XXV, f. 10 b, 15; XXVI, f. 2 b; XXVII, f. 1).

Occasionally it is simulated by other species, especially in the fossil state. This is notably the case in the Pleistocene of Crayford-Erith, where, as already mentioned (p. 95), a very heavy, somewhat triangular variant of *P. henslowanum* is very abundant (Pl. XXV, f. 13; XXVI, f. 13). At this locality *P. supinum* is comparatively rare, whilst at Grays it is the most abundant species.

There are also instances in which thickened variants of *P. casertanum*, especially the right valves (*cf.* Pl. XVIII, f. 12 k & l), closely approach *P. supinum*.

## DISTRIBUTION.

SI

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		NS	CA
HB		SS	
S	RW	RE	EL BF AN
	WI	EI	PN AS
M	AM	PM	FF KI
I	DN	SG	PC KF
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WM	SL	LE	MO IM ML MY EY
EM	RO	CV	LH A SL WY SY LN
WG	NG	LF	WH ME CR DB FT CH DY NM LS
SG	KC	KD	DU MN MG SP ST LR CB WN EN
CL	NT	QC	CW WI CD RA HF WO WW NO HU WS ES
NK	LK	ST	KK WX PB CM BR GE DX BX BD HT NE
SK	MC	EC	WA GM MM GW NW BK MX SE
WC			L NS SW NH SR WK EK
			ND SS DT SH WX EX
			EC SD W
			SC WC

CI

*Pisidium supinum.*

(Recent occurrences are shown in red: fossil occurrences by a line below the symbols. For the explanation of the symbols see p. 20.)

## RECENT.

LONDON.—**L.**

Battersea [Gray Coll.: B.M. 1906. 6. 18: 6-9].

BERKSHIRE.—**BK.**

Eton (R. Thames) [J. E. C.].

BUCKINGHAMSHIRE.—**BX.**

Eton (R. Thames) [J. E. C.]; Iver [J. E. C.]; Marsworth Canal [C. O.].

CAMBRIDGESHIRE.—**CB.** [Gray Coll.: B.M. 1912. 12. 5: 48.]CHESHIRE.—**CH.**

Budworth Mere [A. S. K.]; Kelsall [C. O.] [B.M. 1909. 5. 27: 18-19].

## CUMBERLAND.—CU.

Allouby [W. J. F.]

## HERTFORDSHIRE.—HT.

Rickmansworth [C. O.]; Tring [C. O.]

## LEICESTERSHIRE.—LR.

Aylestone [C. O.]

## LINCOLNSHIRE, SOUTH.—LS.

Grantham Canal [C. S. C.]

## MIDDLESEX.—MX.

Bedfont [J. E. C.]; Thames at Twickenham, Hampton Wick, &c. [J. E. C.] [B.M. 1909.5.27 : 20-25; 1909.5.8; 32-46].

## NORTHAMPTONSHIRE.—NO.

Blisworth [C. O.]

## OXFORDSHIRE.—OX.

Rejectamenta of R. Cherwell, & Mesopotamia, Oxford [H. C. N.]

## STAFFORDSHIRE.—ST.

Wightwick, Wolverhampton (Canal) [H. O.]

## SURREY.—SR.

Chertsey Mead (rejectamenta of R. Thames) [B. B. W.]

## WORCESTERSHIRE.—WO.

R. Severn at Bewdley [H. O.]

## FOSSIL.

## HOLOCENE.

## LONDON.—L.

Chingford [A. S. K.]; Lea Valley [A. S. K.] [B.M.—L. 6750 pars & 10036 pars]; Lea Valley Alluvium [A. S. K.]; Fulham (Betteridge Rd.) [B.M.—L. 6739 pars]; Shacklewell Lane [B.M.—L. 14628]; Westminster [B. B. W.]

## BERKSHIRE.—BK.

Wallingford (Bed A) [A. S. K.]

## BUCKINGHAMSHIRE.—BX.

Boveney [J. E. C.]

## GLOUCESTERSHIRE, WEST.—GW.

Westbury-on-Severn [A. S. K.]

## HUNTINGDONSHIRE.—HU.

St. Ives [A. S. K.]

## KENT, WEST.—WK.

Near East Farleigh [A. S. K.]

## MIDDLESEX.—MX.

Thames Alluvium between Walton & Shepperton [B. B. W.]

## OXFORDSHIRE.—OX.

Clifton Hampden [A. S. K.]

## SURREY.—SR.

Near Staines [A. S. K.]

## PLEISTOCENE.

## LONDON.—L.

Hackney [B. B. W.]; N.E. London [B.M.—L. 5804 pars]; St. James' Square [A. S. K.] [B.M.—L. 14879]; Shacklewell Lane [Prestwich Coll., B.M.—L. 23972].

**CAMBRIDGESHIRE.—CB.**

Barnwell [A. S. K. & B. B. W.] [B.M.—L. 326].

**ESSEX, NORTH.—NE.**

Glaeton [A. S. K. & B. B. W.].

**ESSEX, SOUTH.—SE.**

Grays [A. S. K. & B. B. W.] [B.M.—L. 6695, 7930 & 7932] [M. P. G.]; Ilford [B.M.—L. 6700 *parts*].

**KENT, WEST.—WK.**

Crayford & Erith [A. S. K. & B. B. W.] [B.M.—L. 18609, 19664 *parts*] [M. P. G.]; Swanscombe [A. S. K. & B. B. W.].

**MIDDLESEX.—MX.**

Brentford [B.M.—L. 7637 *parts*]; Ponder's End (Glacial) [A. S. K.]; Twickenham [B.M.—L. 9539].

**SUFFOLK, EAST.—ES.**

St. Cross, S. Elmham [M. P. G.]; Stutton [A. S. K.].

**WORCESTERSHIRE.—WO.**

Birlingham, near Pershore [A. S. K.]; Bricklehampton, near Pershore [A. S. K.]; Croftorhine [M. P. G.] [A. S. K.].

**CROMERIAN.****NORFOLK, EAST.—EN.**

West Runton [A. S. K. & B. B. W.] [N. M.] [M. P. G.].

**PLIOCENE.****NORFOLK, EAST.—EN.**

Bramerton Common [N. M.].

Abroad the species occurs in Scandinavia, France, Germany [from Bremen in Norman Coll.: B.M. 98.5.20: 22170-83 *parts*; 22371-77 *parts*; 22161-65], Russia [Lindholm Coll.] and probably, as Clessin says (35, p. 12), Europe generally north of the Alps. It has been received under another name from Lake Baikal (60 fath.).

As a fossil it is met with in the Holocene and Pleistocene of Denmark [Johansen (85, p. 9)]; in the Pleistocene (Campinien) of Courtrai, Belgium [Mus. Hist. Nat. Brussels]; and in the Pleistocene (Mosbacher Sand) of Hohensachsen and Pilgerhaus (near Weinheim-an-der-Bergstrasse) [Wüst Coll.], and of Mauer (near Heidelberg) [Geyer (65, p. 96)].

**12. *Pisidium parvulum*, Clessin.**

[Pls. II, f. 6; IV, f. 8; XXVII, f. 3-6.]

1873. *Pisidium parvulum*, Clessin: in Westerlund, Fauna Moll. Svec. Norv. et Daniae, p. 553. [non *P. parvulum*, Benson MS.]

This, which is the smallest of the species dealt with in the present monograph, has not yet been met with in the British Isles, either recent or fossil.

Still, it may have been overlooked on account of its small size. If found it will probably, judging from its build, prove an inhabitant of quick-running rather than stagnant water, and should be looked for in fine sand rather than mud.

The original diagnosis (179, p. 553) reads :—

“ *Concha minima*, subinæquilateralis, orbiculato - ovalis, ventricosa, tenuissime striata, nitida, valde fragilis : umbones prominentes, acutiusculi : dentes card. valv. sinistræ 2, tenuissimi, exterior brevis, interiorem brevem, paullo crassiorem, vix curvatum ad dimidium occultans ; dens card. valv. dextræ tenuis, vix arcuatus, parte posteriore paullulum incrassatus.”

The above description does not give the hinge characters sufficiently *in extenso* and may be supplemented as under :—

*Hinge* (Pl. II, f. 6 ; IV, f. 8) about  $\frac{3}{4}$  the length of the shell, very broad and strong, projecting well inwards, highly arched, with two flexures.

R.V. *a. I.* about  $\frac{1}{3}$  the length of the hinge-line, very stout and strong, curving somewhat inwards ; *base* very strong and swollen ; *apex* central, not very prominent, rounded obtuse, inwardly directed ; *ridges* rounded, sloping about equally and fairly steeply, the umboonal descending somewhat the lower.

*a. III.* about  $\frac{1}{2}$  the length of *a. I.*, from which it is separated by a deep pit, stout, straight, closely apposed to the shell-margin ; *apex* central, scarcely prominent, very rounded obtuse ; *ridges* rounded, sloping about equally.

*3.* short, lamelliform, very prominent, flat-topped, slightly arcuate, curving slightly towards the inner margin of the hinge-plate.

*p. I.* about  $\frac{1}{4}$  the length of the hinge-line, narrow, strong, erect, straight ; *base* very strong and swollen ; *apex* distal side of centre, scarcely prominent, somewhat obtuse, pointed ; *ridges* sharp, umboonal descending fairly steeply to the lower level than the distal which is less steep.

*p. III.* about  $\frac{1}{3}$  the length of, and parallel to *p. I.*, stout, straight ; *apex* central, scarcely prominent, obtuse rounded ; *ridges* rounded, descending about equally.

L.V. *a. II.* about  $\frac{1}{3}$  the length of the hinge-line, stout, strong, straight ; *base* very strong and swollen ; *apex* central, very prominent, pointed, obtuse ; *ridges* sharp, distal descending very steeply at first and then gradually, umboonal fairly steeply.

*2.* triangular, prominent, base continuous with that of *a. II.*, apex somewhat backwardly directed.

*4.* lamelliform, sharp, flat-topped, not very prominent, anterior portion nearly parallel to shell - margin,

posterior curving round ♀ and terminating close and almost at right angles to the inner margin of the hinge-plate.

*p. II.* about  $\frac{1}{4}$  the length of the hinge-line, stout, erect, straight; *base* strong and swollen; *apex* nearer distal end, somewhat distally directed, very prominent, sub-acuminate; *ridges* sharp, descending about equally, at first steeply, then gradually.

*Dimensions.*—Clessin's measurements are:—Long. 2, Alt. 1.5, Crass. 1.2 mm. Danish specimens received from Dr. Johansen are only  $1.5 \times 1.4 \times 1.4$  mm.

Clessin has also named a variety (179, p. 553) on account of its greater size and solidity.

The species comes near to *P. supinum* in form, but is squarish instead of triangular.

The type specimens came from the Blekinge, and the variety from Ronneby in Sweden: the Danish specimens are from Fursöen: it has been received under the name of "*P. aliena*, Mts." from Lake Baikal.

### 13. *Pisidium steenbuchii* (Möller).

[Pls. II, f. 7; IV, f. 1; XXVIII, f. 2-8, 10, 11, 14-16.]

- 1842. *Cyclas steenbuchii*, nob.: Möller, Index Moll. Grönlandiae, p. 20; *id.*, Kröyer, Naturhist. Tidsskr. iv, 1842, p. 93.
- 1851. *Pisidium fontinale*, var.? : Middendorff, Reise Siberiens, ii, thl. 1, p. 402.
- 1854. *Sphærium steenbuchii*, Möller: Deshayes, Cat. Conch. Brit. Mus. p. 264.
- 1857. *Pisidium steenbuchii*, Möller: Mörch in Rink, Grönland, &c. ii, till. 4, p. 91; *id.* (reprint) Fortegnel. Grönl. Blöddyr, p. 19.
- 1869. *Pisidium pusillum* [pars]: Jeffreys, Brit. Conch. v, p. 150.
- 1873. *Pisidium globulare*, Cless.: Clessin in Westerlund, Fauna Moll. Svec., Norv. et Daniae, p. 532.
- 1874. *Pisidium steenbuchii*, Mörch [*sic*]: Clessin in Küster, Syst. Conch.-Cab. ix, abth. 3, Cycladeen, p. 35, pl. iii, f. 21, p. 22.
- 1886. *Pisidium hoyeri*, n. sp.: Clessin in Esmark & Hoyer, Malakozool. Blät., N. F. viii, p. 120.
- 1909. *Pisidium korotnevi*, n. sp.: Lindholm in Korotneff, Wissensch. Ergebn. Zool. Exped. Baikal-See, iv, p. 85, pl. ii, f. 47, p. 48.

The species is not common in this country, either recent or fossil, and its first record from Perthshire was made in error on an abnormal example of *P. lilljeborgii* (193, p. 5). It is stated by Mörch to be rare in Greenland, whence it was first described by Möller (115, p. 20) under the genus *Cyclas* as:—

“Testa inaequilatera, subtrigona, antice obtusa, ventricosa, laevi, cinereo-lutescente; umbonibus prominentibus; sulcis incrementi 4-5.”

Mörch's diagnosis (121, p. 37) is a little more explicit :—

“ *T. oblique-ovalis, ventricosa, striis incrementi subtilissimis, sulci incrementi 5–6 remoti contasbulati [sic], cinereo-lutescente, intus cinerea; umbones gibbos.* ”

But Clessin's description of his *Pisidium globulare* (179, p. 532), which comparison of authentic specimens shows to be the same, conveys a more accurate notion :—

“ *Concha mediocris, rotundato-ovata, tenuis, subtiliter striata flavo-cornea; umbones prominentes, lati, rotundati; ligamentum contectum; dentes card. valv. sinistræ 2, posterior brevis, tenuis, vix curvatus, anterior crassus, in angulum curvatus, dens card. valv. dextræ curvatus, parte posteriore brevi, crassiore, parte anteriore longiore, tenui.* ”

To this again must be added the details concerning the characters of the hinge :—

*Hinge* (Pl. II, f. 7; IV, f. 1) about  $\frac{3}{4}$  the length of the shell, not very broad and not projecting much inwards, strongly arched.

R.V. *a. I.* about  $\frac{1}{3}$  the length of the hinge-line, narrow, fairly strong, slightly deflected inwards; *base* fairly strong; *apex* central, prominent, acuminate; *ridges* fairly sharp, sloping about equally and steeply.

*a. III.* about  $\frac{1}{3}$  the length of, and parallel to *a. I.*, narrow, straight, inclined toward the shell-wall; *apex* distal side of centre, pointed, obtuse; *ridges* somewhat rounded, descending equally and gradually.

*S.* lamelliform, prominent, anterior end higher, sharply flexed; *a* fairly parallel to the shell-margin, *b* running diagonally across the hinge-plate to its margin.

*p. I.* not quite  $\frac{1}{3}$  the length of the hinge-line, narrow, fairly strong, straight; *base* not strong; *apex* nearer distal end, fairly prominent, pointed, obtuse; *ridges* sharp, sloping about equally and fairly gradually,

*p. III.* about  $\frac{1}{3}$  the length of, and parallel to *p. I.*, narrow, fairly strong, straight; *apex* about central, obtuse; *ridges* somewhat rounded, sloping about equally and fairly gradually.

L.V. *a. II.* about  $\frac{1}{3}$  the length of the hinge-line, narrow, fairly strong, curving with the shell-margin; *base* fairly strong; *apex* central, very prominent, very acuminate, slightly distally directed; *ridges* fairly sharp, distal exceedingly steep at first, then sloping gradually, umbonal steep.

*2.* triangular, prominent, base continuous with that of *a. II.*, apex backwardly directed.

4. lamelliform, sharp, curving backwards round 2 to near the inner margin of the hinge-plate.  
*p. II.* not quite  $\frac{1}{3}$  the length of the hinge-line, very narrow, fairly strong, straight; *base* fairly strong;  *apex* at distal end, distally directed, prominent, acuminate; *ridges* sharp, umbonal descending gradually, distal very steeply at first, then gradually.

*Dimensions.*—Möller gives simply “Diam. 2” which is equivalent to 4.2 mm. Mörch gives Long. 4, Alt. 3.5 mm., and Clessin Long. 5, Alt. 4, Crass. 3 mm. An example sent from Finmarken (Norway) by Dr. Johansen is 4.8  $\times$  4  $\times$  4 mm. The English specimens are small, the largest taken by Mr. Carter in Burwell Wood (Lincolnshire) is 3.8  $\times$  3.3  $\times$  2.8 mm.

The 4 or 5 more strongly marked lines of growth due to coloration noted in the preceding descriptions, though frequent in the species, are not peculiar to it.

The species has nothing in common with *Pisidium pusillum* of Turton, nor of Jeffreys as alleged by Clessin.

From even small rounded forms of the still-water variety of *P. casertanum*, or from *P. nitidum*, it may be distinguished by being yet rounder and having the hinge lighter and slightly more arcuate: its outer lateral teeth (*a. III.*, *p. III.*) are proportionately longer, and all the other laterals have their apices nearer the umbo; in the cardinals, 3 is more sharply flexed and thinner, 2 is more backwardly directed, whilst 4 is more curved and not so diagonally placed.

Compared with the smoother forms of *P. lilljeborgii* it is less orbicular, less regularly striate, and lacks the angularity at the junction of the dorsal with the posterior margin; the hinge is longer and less arcuate, the inner and outer lateral teeth of the right valve are not so equal in size and do not converge towards the umbo; whilst in the cardinals of the left valve 2 is less strong and more backwardly directed and 4 does not extend so far backward.

Taking the specimens from the type locality Greenland as being the most normal (Pl. XXVIII, f. 6, 7 & 10), it will be seen that the specimens from Bjerking, Norway (Pl. XXVIII, f. 3 & 15), and from Finmarken, Norway (Pl. XXVIII, f. 16), both of which are examples of Clessin's *P. globulare*, cannot be separated from them, though the last-named are slightly more oval.

Of the British representatives those from Grisel Bottom, Lincolnshire (Pl. XXVIII, f. 5, 8 *a*, *b*, & 11 *a*, *b*), come nearest to the type, but are slightly less tumid, whilst the specimens from Abbey Holme, Cumberland (Pl. XXVIII, f. 2 & 4), are both smaller and more oval.

## DISTRIBUTION.

SI

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		NS CA
HB		SS
S	RW RE EL BF AN	
	WI EI PN AS	
M	AM PM FF KI	
I	DN SG PC KF	
CT	B RF LL ED HD	
	AY LA PE BW NN	
WD ED LD AN	WT KB DF SK RX SN	
FE TY AR DO	IM CU WL NY DM	
WM SL LE MO		ML MY EY
EM RO CV LH		SL WY SY LN
WG NG LF WH ME	A CR DB FT CH DY NM LS	
SG KC KD DU	MN MG SP ST LR CB WN EN	
CL NT OC CW WI	CD RA HF WO WW NO HU WS ES	
NK LK ST KK WX	PB CM BR GE OX BX BD HT NE	
SK MC EC WA	GM MM GW NW BK MX SE	
WC	NS SW NH SR <sup>2</sup> WK EK	
	L ND SS DT SH WX EX	
	EC SD IW	
SC WC		

CI

*Pisidium steenbuchii.*

(Recent occurrences are shown in red: fossil occurrences by a line below the symbols. For the explanation of the symbols see p. 20.)

## RECENT.

## ENGLAND.

BUCKINGHAMSHIRE.—BX.

Boveney [J. E. C.].

CUMBERLAND.—CU.

Abbey Holme [J. L.].

## LINCOLNSHIRE, NORTH.—LN.

Louth (Burwell Wood) [C. S. C.]; Tetney Lock [C. S. C.]

## WESTMORLAND.—WL.

Patterdale [J. L.].

## IRELAND.

## CORK, WEST.—WC.

Coomerkane Valley [K. H. J.].

## GALWAY, SOUTH.—SG.

Rea, L., in association with *P. lilljeborgii* [R. A. P.].

The continental distribution of *P. steenbuchii* as at present known is certainly peculiar. Besides Greenland [Nat. Hist. Mus. Copenhagen, & Norman Coll., B.M. 98.5.20 : 22507-11] and Iceland [F. H. Sikes Coll.], it is known from Scandinavia [Lynge Coll.; Johansen Coll.; & Norman Coll., B.M. 98.5.20 : 22166-69], whilst specimens were collected by Dr. Scharff at Frankfort-on-the-Maine [Conch. Soc. Coll.] and it has been received from R. Schtschutschja, Eastern Siberia, under the name *P. costulatum*, and from Lake Baikal as *P. korotnevi*, Lindholm (95, p. 85).

As a fossil it occurs in the Pleistocene of Denmark [Johansen (85, p. 9)].

14. ***Pisidium lilljeborgii*, Clessin.**

[Pls. II, f. 8 ; IV, f. 2 ; XXIII, f. 2 & 18 ;  
XXVIII, f. 1, 9, 12, 13, 17-26.]

- 1862. *Pisidium nitidum*, var. *splendens*, Baudon : Jeffreys (*non* Baudon)  
Brit. Conch. i, p. 25. [*Cf.* specimens from type loc., Lerwick, in  
Norman Coll., B.M. 1911.10.26 : 7681-95.]
- 1886. *Pisidium lilljeborgii*, n. sp. : Clessin in Esmark & Hoyer, Malak.  
Blätt., N.F. viii, p. 119.
- 1889. *Pisidium alpicola*, Cless. [n. n.] : Clessin in Suter, Malak. Blätt.,  
N.F. xi, p. 191. [*Cf.* specimens from type loc., Berglisee  
(7,546 ft.), in Norman Coll., B.M. 98.5.20 : 22440-43.]
- 1890. *Pisidium loveni*, Clessin : Clessin, Moll. Oesterreich-Ungarns,  
p. 765 [for the preceding].
- 1909. *Pisidium nordenskiöldi*, var. *semenkevitschi*, nov. : Lindholm in  
Korotneff, Wissensch. Ergebni. Zool. Exped. Baikal-See, iv,  
p. 86, pl. ii, f. 49, 50.

This exceedingly pretty and well-marked northern form was originally described (59, p. 119) as follows :—

“Muschel schief, sehr ungleichseitig, sehr aufgeblasen,  
unregelmässig stark gestreift, von gelblicher Hornfarbe ;

*Vordertheil* sehr verkürzt, abgestutzt, gerundet; *Hintertheil* zugespitzt gerundet. Wirbel sehr aufgeblasen und hervortretend. Oberrand gewöbelt, sehr schmal, durch die schwach markirten Ecken des Schildes und Schildchens begrenzt. *Vorderrand* kurz, steil abfallend. Unterrand sehr gebogen, ohne markirte Grenze an die Nebenränder anschliessend. *Hinterrand* kurz, steil abfallend, wenig gewölbt. Ligament kurz, stark, Schloss zusammengedrängt, kurz, ziemlich stark. Zähne wenig hervortretend. Perlmutt schwach weisslich; Muskelnarben kaum vertieft."

When writing the above diagnosis the author momentarily forgot that the external form of the *Pisidium* shell is the reverse of that of other bivalves and it is therefore necessary to transpose the two "Vorder-" and "Hinter-", which are italicized. The lacking details concerning the hinge characters are:

*Hinge* (Pl. II, f. 8; IV, f. 2) about  $\frac{2}{3}$  the length of the shell, wide, projecting well inwards, very strong, arcuate, with anterior flexure.

R.V. *a. I.* about  $\frac{3}{8}$  the length of the hinge-line, stout, very strong, curving well inwards; *base* strong and slightly swollen; *apex* distal side of centre, prominent, bluntly acuminate; *ridges* rounded, distal almost vertical at first, then nearly horizontal, umbonal fairly steep.

*a. III.* about  $\frac{1}{2}$  the length of *a. I.*, narrow, strong, apposed to the shell-margin; *apex* at distal end, fairly prominent, rectangular; *ridges* somewhat rounded, distal vertical, umbonal sloping gradually.

*3.* lamelliform, not very prominent, sharply flexed; *a* parallel to the shell-margin, *b* running diagonally backward across the hinge-plate almost to its inner margin.

*p. I.* about  $\frac{1}{4}$  the length of the hinge-line, rather narrow, strong, curving with the shell-margin; *base* strong; *apex* distal side of centre, distally directed, prominent, obtusely acuminate; *ridges* somewhat rounded, umbonal sloping fairly steeply, distal very steeply at first, then nearly horizontal.

*p. III.* about  $\frac{1}{2}$  the length of *p. I.*, narrow, strong, straight, erect, umbonally convergent to *p. I.*; *apex* at distal end, prominent, rectangular; *ridges* somewhat rounded, umbonal gradually sloping, distal vertical.

L.V. *n.* about  $\frac{3}{8}$  the length of the hinge-line, stout, strong, faintly curving inwards; *base* strong and swollen; *apex* central, somewhat distally directed, very prominent,

- curving outwards, acuminate; *ridges* fairly sharp, distal very steep at first, then gradual, umbonal fairly steep.
2. prominent, obtusely triangular, apex directed backwards and towards umbo, base continuous with that of *a. II.*
  4. lamelliform, sharp, faintly arcuate, running diagonally at a rather low angle across the hinge-plate to near its inner margin.
  - p. II.* about  $\frac{1}{4}$  the length of the hinge-line, rather narrow, strong, curving with the hinge-line and inclined outwards; *base* strong and swollen; *apex* distal side of centre, distally directed, very prominent, acuminate; *ridges* rounded, umbonal descending fairly gradually, distal very steeply, almost vertically at first, then gradually.

*Dimensions.*—None are given by Clessin; Westerlund, however (Faun. Paläaret. vii, p. 25) gives, Long. 4, Alt. 3, Crass. 2·5 mm. Specimens from Söerset (Norway) sent by Dr. Johansen are somewhat smaller and measure: 3·5  $\times$  3  $\times$  2·4 mm. The Perthshire examples received from Dr. Laidlaw attain 4·4  $\times$  4·4  $\times$  3·3 and those from Mr. Jackson from Hawes' Water 3·75  $\times$  3·4  $\times$  2·6 mm.

Clessin when describing the type founded at the same time a "var. *transversale*" on quite immaterial superficial features.

Although externally this species, and especially the Norwegian types, at first sight recalls *P. obtusale*, its stronger striation, and the angle at junction of the dorsal and posterior margin serve to distinguish it, whilst its very well-marked hinge characters readily differentiate it from that and all the other species.

Specimens from Söerset, Norway, named by Clessin are shown on Pl. XXVIII, figs. 17 *a-c*, 19 *a, b*, & 22 *a-j*. The Irish specimens closely resemble them but are on the whole larger (Pl. XXVIII, f. 18 *a, b*, & 25 *c & d*).

The species varies somewhat in outline even in a given locality. Thus those from Lough Aguse, Co. Fermanagh, range from the normal orbicular (Pl. XXVIII, f. 25 *c & d*) through the obliquely orbicular (f. 25 *e & f*) to oval (f. 25 *a & b*). The obliquely orbicular form also occurs at Lochan a' Chait, Perthshire (Pl. XXVIII, f. 13 *a, b*). Similar variation is also noticeable in fossil examples from the Holocene at Gayfield, Edinburgh (Pl. XXVIII, f. 20 *a-d*, & 24 *a-d*). In these and other species of *Pisidium* from the same deposit, as already noted, the umbones are exceptionally developed. Occasionally the external sculpturing is so marked as to give rise to a superficial resemblance to *P. pulchellum* (Pl. XXIII, f. 2).

## DISTRIBUTION.

SI

OI

		NS	CA
HB		SS	
S	RW RE EL BF AN WL EI PN AS		
M	AM PM FF KI DN SG PC KF		
I	RF LL ED HD CT AY LA PE BW NN		
WD	ED LD AN	WT KB DF SK RX SN	
FE	TY AR DO	CU WL NY DM	
WM	SL LE MO	IM ML MY EY	
EM	RO CV LH	SL WY SY LN	
WG	NG LF WH ME	CR DB FT CH DY NM LS	
-SG	KC KD DU	MN MG SP ST LR CB WN EN	
CL	NT QC CW WI	CD RA HF WO WW NO HU WS ES	
NK	LK ST KK WX	PB CM BR GE OX BX BD HT NE	
SK	MC EC WA	GM MM GW NW BK MX SE	
WC		NS SW NH SR WK EK	
		L ND SS DT SH WX EX	
		EC SD IW	
SC	WC		

CI

*Pisidium lilljeborgii.*

(Recent occurrences are shown in red: fossil occurrences by a line below the symbols. For the explanation of the symbols see p. 20.)

## RECENT.

## ENGLAND.

## LANCASHIRE, MID.—ML.

Hawes Water, Silverdale [J. W. J.].

## WALES.

## CARNARVONSHIRE.—CR.

Llyn Idwal (1200') [C. O.]; Llynan Mymbyr (588'), Capel Curig [C. O.].

## SCOTLAND.

**BUTE, ARRAN Is., &c.—B.**

Arran I. (Urie Loch, 1300') [K. H. J.]

**PERTHSHIRE, MID.—PM.**

Lochan a' Chait (2250') [F. F. L.]

**SHELVES.—SI.** [B.M. 61.11.22: 22 & 1911.10.26: 7681-95.]

**SKYE.—S.**

Loch na Harsaich (750', near Broadford) [J. R. Le B. Tomlin].

## IRELAND.

**ANTRIM.—AN.**

Carnlough, Loughs to W. of (1000') [H. T.]

**CORK, WEST.—WC.**

More, L. [K. H. J.]

**DONEGAL, EAST.—ED.**

Acapple, L. [H. T.]; Acheson's L. [H. T.]; Aghvog, L. [H. T.]; Awaddy, L. [H. T.]; Ballywara, L. [H. T.]; Columbkille, L. [H. T.]; Derg, L. [H. T.]; Lee, L. [H. T.]; Roslin, L. [H. T.]; Rushen, L. [H. T.]; Shivenagh, L. [H. T.]; Tullynacross, L. [H. T.]; Tullynasiddagh [H. T.]; Vearty, L. [H. T.]

**DONEGAL, WEST.—WD.**

Fern, L. [J. N. M.]; Melmore, L. [A. W. S.]

**FERMANAGH.—FE.**

Aguse, L. [A. W. S.]; Aguse More, L. [H. T.]; Aguse More West, L. [H. T.]; Anlaban, L. [H. T.]; Awaddy, L. [H. T.]; Bigwood (Rules Pond) [H. T.]; Derrintrag, L. [H. T.]; Enniskillen [A. S. K.]; Glencreawan, L. [H. T.]; Macroagh, L. [H. T.]; Mallybreen, L. [H. T.]; Nafeola, L. [H. T.]; Nawalskey, L. [H. T.]; Rushen, L. [H. T.]; Scolban, L. [H. T.]; Tully Lough [H. T.]; Tullylough More [H. T.]; Tullyvogy, L. [H. T.]; Vearty, L. [H. T.]

**GALWAY, SOUTH.—SG.**

Atorisk, L. [R. A. P.]; Ballinasloe [R. A. P.]; Rea, L., in association with *P. steenbuchii* [R. A. P.]; Woodford (L. Alee) [R. A. P.]

**GALWAY, WEST.—Callow, L. [D. M.]**

**KERRY, NORTH—NK.**

Killarney [B.M. 59.5.16: 6 pars].

**KERRY, SOUTH.—SK.**

Dingle Promontory (Lakes up to 1500') [A. W. S.]; Nagarriva, L. [A. W. S.]

**LONDONDERRY.—LD.**

Enagh L. [J. N. M.]

**MAYO, WEST.—WM.**

Achill I. [A. W. S.]; Dougan, L., near Newport [A. W. S.]

**WESTMEATH.—WH.**

Drin, L., Mullingar [A. W. S.]

**FOSSIL.**  
**HOLOCENE.**

**LONDON.—L.**

Shand St., Tooley St. [A. S. K.]

**LANCASHIRE, MID.—ML.**

Hawes Water, Silverdale [J. W. J.]

**SCOTLAND.****EDINBURGH.—ED.**

Edinburgh (Gayfield) [M. P. G.]; Edinburgh (Meadows) [B.M. 98005 *pars*].

**IRELAND.****CLARE.—CL.**

Inchiquin [A. S. K.]

**KILDARE.—KD.**

Ballybetagh [A. S. K.]

**PLEISTOCENE.****ESSEX, SOUTH.—SE.**

Ilford [B.M.—L. 10042].

**KENT, WEST.—WK.**

Crayford-Erith [A. S. K. & B. B. W.] [B.M.—L. 6691].

**CROMERIAN.****NORFOLK, EAST.—EN.**

West Runton [A. S. K.] [N. M.] [M. P. G.]

Judging from its distribution so far as at present known, this would appear to be an Alpine form. It has been seen from Iceland [F. H. Sikes Coll.], Lapland [Riksmuseum, Stockholm], Sönset, Norway [Johansen Coll.], Sealand [Lyngé Coll.], the Berglisee am Hausstock (alt. 7546'), Switzerland [as *P. alpicola*, Cless. (= *P. loveni*, Cless.) Norman Coll., B.M. 98.5.20: 22440-43], and from Lake Baikal [Lindholm Coll. as *P. nordenskiöldi*, var. *semenkevitschi*, Lindholm (95, p. 86)].

The sole record of its occurring fossil in any foreign locality is in the Pleistocene (Hesbayen) at Soignies, Belgium [Mus. Hist. Nat. Brussels].

**15. *Pisidium hibernicum*, Westerlund.**

[Pls. II, f. 9; IV, f. 5; XXIX, f. 1-6.]

1894. *Pisidium (Fossarina) hibernicum*, n. sp.: Westerlund, Nachrichstbl. Deutsch. Malak. Gesell. xxvi, p. 205.

1895. *Pisidium (Fossarina) hibernicum*, Westerl.; Scharff, Irish Naturalist, iv, p. 335, figs.

The present species, which is a very distinct form, originally first collected by Dr. Scharff, was described by Westerlund (186, p. 205) in the following terms:—

“C. supra medium ventricosissima, lateribus leviter convexis regulariter ad marginem inferum declivis, truncato-ovata,

ubique sulcato-striata, marginibus omnibus regulariter arcuatatis, parte posteriore brevissima, anteriore duplo longiore, ad margines compressa, sed obtusissima; umbones validi, lati, tumido-rotundati, prominentes."

No details were given concerning the hinge characters, which may be thus particularized:—

*Hinge* (Pl. II, f. 9; IV, f. 5) about  $\frac{2}{3}$  the length of the shell, narrow, scarcely projecting save at the umbo, not very strong, flatly arcuate.

R.V. *a. I.* about  $\frac{1}{4}$  the length of the hinge-line, narrow, not very strong, strongly bowed inwards; *base* fairly strong, somewhat swollen; *apex* central, prominent, pointed obtuse; *ridges* somewhat rounded, sloping about equally, at first steeply and then running out horizontally.

*a. III.* about  $\frac{1}{3}$  the length of *a. I.*, from which it is separated by a deep fossa, not very strong or prominent; *apex* about central, not very prominent, somewhat outwardly inclined, rounded obtuse; *ridges* sloping away about equally.

*3.* lamelliform, prominent, nearly straight, top irregular; *b* somewhat thickened, sometimes sulcate.

*p. I.* about  $\frac{1}{4}$  the length of the hinge-line, narrow, fairly strong, straight, erect; *base* fairly strong and swollen; *apex* distal side of centre, prominent, somewhat acuminate; *ridges* fairly sharp, umbonal descending fairly steeply at first, then gradually, distal very steep.

*p. III.* about  $\frac{1}{3}$  the length of *p. I.*, from which it is separated by a deep fossa, very inconspicuous, closely apposed to the shell-wall; *apex* very obtuse.

L.V. *a. II.* about  $\frac{1}{4}$  the length of the hinge-line, rather narrow, strong, straight; *base* strong, somewhat swollen; *apex* central, exceedingly prominent, acuminate, somewhat distally directed, with peculiar outward twist; *ridges* sharp, distal sloping down very steeply and descending to a lower level than the umbonal, which is not quite so steep.

*2.* very prominent, obtusely triangular, with backwardly directed apex, base continuous with that of *a. II.*

*4.* lamelliform, not prominent, nearly straight, running backwards from above 2 with slight downward diagonal inclination.

*p. II.* about  $\frac{1}{4}$  the length of the hinge-line, rather narrow, strong, straight; *base* strong, slightly swollen; *apex* near distal end, very prominent, acuminate; *ridges* sharp, descending about equally, very steeply at first and then gradually.

*Dimensions.*—Westerlund's measurements are :—Long. 3·5, Alt. 3·5, Crass. 3·5 mm., but a larger specimen in the National Museum, Ireland, is Long. 4·5, Alt. 4 mm. The West Galway specimens were smaller and less globose: 2·8 × 2·5 × 1·8 mm.

The outstanding feature of the species, apart from its globular form, is the peculiar curve and twist of the anterior principal lateral teeth, with the deep fossæ behind them. No similar characters occur in any of the members of the genus treated of in this Catalogue.

Judging from the specimens received from other places, there can be no doubt but that those from the type locality represent an abnormally swollen form.

## DISTRIBUTION.

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S	RW RE EL BF AN WI EI PN AS	
M	AM PM FF KI DN SG PC KF	
I	CT B RF LL ED HD AY LA PE BW NN	
WD ED LD AN	WT KB DF SK RX SN	
FE TY AR DO	IM CU WL NY DM	
WM SL LE MO		ML MY EY
EM RO CV LH		SL WY SY LN
WG NG LF WH ME	A CR DB FT CH DY NM LS	
SG KC KD DU		MN MG SP ST LR CB WN EN
CL NT QC CW WI		CD RA HF WO WW NO HU WS ES
NK LK ST KK WX	PB CM BR GE OX BX BD HT NE	
SK MC EC WA	GM MM GW NW BK MX SE	
WC		NS SW HN SR WK EK
	L ND SS DT SH WX EX	
	EC SD	IW
SC WC		

CI

### *Pisidium hibernicum.*

(Recent occurrences are shown in red: fossil occurrences by a line below the symbols. For the explanation of the symbols see p. 20.)

## RECENT.

CORK, WEST.—WC.

L. Namaddra and small unnamed tarn close thereto [A. W. S.].

GALWAY, WEST.—WG.

Inishbofin (L. Gowlanagower) [A. W. S.].

GALWAY, SOUTH.—SG.

Tullanafrankagh, L. [R. A. P.]

KERRY, SOUTH.—SK.

L. Nagarriva [D. M.] [K. H. J.] [A. W. S.] [R. A. P.]

Quite recently Dr. Nils Hj. Odher, of the Riksmuseum at Stockholm, very kindly forwarded specimens from the Täkern See, Östergötland, Sweden, among which this species occurred in abundance. They were found in *Chara* at a depth of about 1 m. with *P. subtruncatum*, *P. casertanum*, *P. nitidum*, *P. milium* and *P. lilljeborgii*. The species is, therefore, a northern one and should now be sought for in tarns in the Western Highlands of Scotland.

16. **Pisidium obtusale** (Lam.?) Jenyns.

[Pls. II, f. 10; IV, f. 4; XXX.]

1818. ?*Cyclas obtusalis*: Lamarck, Hist. Anim. sans Vert. v, p. 559  
(id., 2nd ed., vi, 1835, p. 269).
1821. *Pisidium obtusale*, Lam.?: Pfeiffer, Naturg. Deutsch. Moll. i, p. 125, pl. v, f. 21, 22.
1832. *Pisidium obtusale*, Pfeiff.: Jenyns, Trans. Camb. Phil. Soc. iv, p. 301, pl. xx, f. 1-3.
1837. *Pisidium fontinale*, var. *obtusale*, mihi: Held, Isis, 1837, col. 306.
1843. *Cyclas fontinalis*, var. B. *obtusalis*: Dupuy, Essai Moll. Gers, p. 89.  
— *Cyclas obtusalis*, Lam.; Hanley, Cat. Rec. Bivalve Shells, p. 90.
1852. *Pera gibba*: Leach, Moll. Brit. Synop. p. 292.
1854. *Pisum obtusale*, Lamk.: Deshayes, Cat. Conch. Brit. Mus. ii, p. 279.
1855. *Pisidium globulosum*, nob.: Gassies, Actes Soc. Linn. Bordeaux, xx, p. 348, pl. ii, f. 8.
1857. *Pisidium casertanum*, var. G. *globulosum*, Gass.: Baudon, Mém. Soc. Acad. Oise, iii, p. 343 & 348.
1858. *Musculium obtusale*, Pfeiff.: Adams, Gen. Rec. Moll. ii, p. 452.
1859. *Pisidium pusillum*, var. *obtusalis*: Jeffreys, Aun. & Mag. Nat. Hist. III, iii, p. 37.
1862. *Pisidium nitidum*, Jenyns (pars): Jeffreys, Brit. Conch. i, p. 25.
1873. *Pisidium scholtzii*, n. sp.: Clessin, Malakozool. Blätt. xx, p. 23, pl. i, f. 1.
1902. ?*Pisidium raddei*, n. sp.: Dybowski, Nachrichtenbl. Deutsch. Malakoz. Gesell. xxxiv, p. 95; Rossmässler, Icon., N. F. x, f. 1810.
1903. *Corneocyclas (Cyclocalyx) scholtzii*, Cless.: Dall, Proc. Biol. Soc. Washington, xvi, p. 7.

The recognition of this very distinct form must be attributed to Jenyns, for though he like Pfeiffer adopted Lamarck's name, there is no evidence as to the true nature of the forms those two older

naturalists had before them. Both Pfeiffer and Jenyns question whether their specimens belonged to Lamarck's species; but while Pfeiffer's diagnosis and figures are too vague to permit of an authoritative statement as to the identity of his species, there can be no question concerning Jenyns', as a glance at his specimens at Bath shows. Jeffreys, as already mentioned (p. 11), had confused Jenyns' *P. nitidum* and the present species.

Under the circumstances it may be well to give the three successive descriptions. Lamarck's (92, v, p. 559) is:—

“*C. testâ ovali, tumidâ, subinæquilaterâ, pellucidâ, fragilissimâ; umbone obtusissimo. Mon cabinet .... Elle a des rapports avec la suivante [Cyclas fontinalis].*”

Pfeiffer's diagnosis (134, i, p. 125) is more extended:—

“*P. testa oblique cordata, ventricosa, tenuissime striata, pellucida, fragilissima; umbone obtusissimo .... Gehäus: schief herzförmig, bauchig, etwas ungleichseitig, glänzend, sehr fein kaum bemerklich gestreift, durchsichtig, gelblich weiss. Der untere Rand scharf. Die Wirbelpitzen vorstehend, sehr stumpf, gerundet.*”

Jenyns (83, p. 301), while assigning to coloration more than its due, gives the best summary of the external characters:—

“*P. testâ globosâ, obliquè subovali, tenuissimè striatâ; umbonibus prominulis, obtusissimis. . . . . Var. β. Testâ ovato-trigonâ, ventricosissimâ, margine obtusissimo. . . . . Testa globoso-ovalis, ventricosissima, crassitudine ferè altitudinem æquanti, nitida, subtiliter striata; plerumque virescenti-nigra vel ochraceo-nigricans, zonâ marginali (junioribus latissimâ) lutescenti, interdum subaurantiâ; rariùs omnino lutescens: umbones tumidi, obtusè rotundati, paulò prominentes.*

“*Var. β. gaudet testâ ventricosiori, margine basali obtusissimo, quò minuatur altitudo, et forma magis trigona vel ovato-trigona provenit. Hæc varietas plerumque nigricans, ochraceo plus minusve fucata.*”

To this it is only necessary to add a detailed description of the hinge characters:—

*Hinge* (Pl. II, f. 10; IV, f. 4) about  $\frac{1}{2}$  the length of the shell, strong, narrow, especially at the umbo, projecting well inwards, roundly arched, with slight anterior flexure in right valve.

R.V. *a. l.* about  $\frac{5}{2}$  the length of the hinge-line, strong, stout, inclined a little inwards; *base* strong and swollen (especially in old specimens); *apex* central, or on umbonal side of centre, prominent, acuminate to rounded obtuse; *ridges* rounded, sloping about equally, fairly steeply (in old specimens fairly gradually).

*a. III.* about  $\frac{1}{4}$  the length of *a. I.*, very obscure, closely apposed to the shell-margin.

*3.* very prominent, faintly arcuate, thin, sharp, very slightly thickened posteriorly, flat-topped, sides vertical.

*p. I.* about  $\frac{1}{3}$  the length of the hinge-line, narrow, strong, straight, erect; *base* strong and swollen (especially in old specimens); *apex* central, distally directed, prominent, acuminate to rounded obtuse; *ridges* slightly rounded, sloping about equally, fairly steeply (in old specimens more gradually).

*p. III.* not quite  $\frac{1}{3}$  the length of *p. I.*, to which it is parallel, erect, narrow, but spreading umbonally, and becoming confluent with *p. I.*; *apex* central, scarcely prominent, very obtuse-pointed; *ridges* compressed, sloping about equally.

L.V. *a. II.* about  $\frac{5}{12}$  the length of the hinge-line, strong, narrow, erect, straight; *base* very strong and swollen; *apex* central, or on umbonal side of centre, very prominent, acuminate; *ridges* fairly sharp, distal exceedingly steep at first, then almost horizontal, umbonal descending very steeply to a slightly lower level than the distal.

*2.* very narrow and prominent, with vertical sides, erect, the rounded cusp bent sharply outwards.

*4.* narrow, thin, sharp, slightly inclined backwards, diagonally across the hinge-plate.

*p. II.* about  $\frac{1}{3}$  the length of the hinge-line, narrow, strong, straight, with slight outward tilt; *base* strong and swollen (especially in old specimens); *apex* distal side of centre, very prominent, distally directed, acuminate; *ridges* somewhat rounded, umbonal descending fairly gradually, distal nearly vertical at first, then sloping very gradually.

*Dimensions.*—Lamarck simply says:—"Largeur, près de 4 millimètres"; Pfeiffer's measurements converted into millimetres are, Long. 2, Alt. 2·5, Crass. 1·5 mm.; Jenyns', similarly treated, are 3·5  $\times$  3  $\times$  3 mm. One from Lytham (Lancs.) collected by Mr. W. M. Webb is 3·7  $\times$  3·3  $\times$  3·4 (Pl. XXX, f. 15), whilst in Mr. Cooper's collection one from Criccieth (Carnarvon) is 3·75  $\times$  3·5  $\times$  2·5 mm.

This species more commonly retains the hairy periostracum to the adult state. Its less tumid forms may be distinguished from the rounded individuals of other species by the shortness of the hinge-line, the peculiar manner in which it is cut away at the umbo, by the position of the apices of the lateral teeth which are at most central, and often on the umbonal side of the centre, a feature shared by no other species, by the almost total suppression of the anterior lateral *a. III.*, and by the narrow, straight-sided, boldly upstanding cardinals, especially ♀ whose rounded cusp is bent sharply over at the top as to impart to the whole tooth the appearance of a staple.

Swollen specimens can be differentiated from forms of *P. lilljeborgii*, not only by the above characteristics but externally by their smoother surface and the lack of the angularity of the posterior dorsal margin so typical of the latter.

That the species is liable to considerable variation is manifest from the figures (Pl. XXX), and is sometimes seen in a single gathering such as that from Birch (Essex) (Pl. XXX, f. 1 & 16). One of the more swollen examples from this locality is shown at fig. 2 on the same plate, and compares with that at fig. 5 from T. Rogers' collection named by Jeffreys "*P. nitidum*, var. *globosa*." The least tumid form, figs. 4 & 10, came from Guildford; the most oval examples are represented in figs. 13, 14 & 15, the last named from Lytham being one of the largest met with. The thinnest were those from Lochmaben, figs. 8 & 18, whilst a quaint abnormality from Walworth Wood (Londonderry) is portrayed in fig. 7.

## DISTRIBUTION.

SI

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EM RO CV LH		SL WY SY LN
WG NG LF WH ME	A CR DB FT CH DY NM LS	
SG KC KD DU	MN MG SP ST LR CB WN EN	
CL NT QC CW WI	CD RA HF WO WW NO HU WS ES	
NK LK ST KK WX	PB CM BR GE OX BX BD HT NE	
SK MC EC WA	GM MM GW NW BK MX SE	
WC	NS SW NH SR WK EK	
	ND SS DT SH WX EX	
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CI

### *Pisidium obtusale.*

(Recent occurrences are shown in red: fossil occurrences by a line below the symbols. For the explanation of the symbols see p. 20.)

## RECENT.

## ENGLAND.

LONDON.—**L.**

Battersea [Gray Coll., B.M. 1906. 6. 18 : 1-4]; Finchley Common [J. E. C.]; Thames at Putney [W. M. W.]

BUCKINGHAMSHIRE.—**BK.**

Iver [J. E. C.]; near Uxbridge [J. E. C.]; Weston Turville [J. E. C.]

CHESHIRE.—**CH.**

Baguley [C. O.]; Birkenhead [E. R. S.]; Brines Brow, Mouldsworth [C. O.]; Chester [B. B. W.]; Helsby [B. B. W.]; Mobberley [C. O.]; Mouldsworth [J. E. C.]; Oakmere [C. O.]; Ringway [C. O.]

CUMBERLAND.—**CU.**

Bassenthwaite [W. J. F.]; Dalston [J. L.]; Wreay [J. L.]

DEVONSHIRE, NORTH.—**ND.**

Morthoe district [J. L.]

DURHAM.—**DM.**

Butterwick [B.M. 1911. 10. 26 : 7946-48]; Elwick [B.M. 1911. 10. 26 : 7863-72]; Newsham [E. R. S.]

ESSEX, NORTH.—**NE.**

Birch [W. M. W.]; Coggeshall [B.M. 47.11.19 : 148-162]; Colchester (?) [W. M. W.]

HERTFORDSHIRE.—**HT.**

Aldenham [C. O.]; Berkhamstead [C. O.]; Colney Heath [C. O.]; Marsworth Reservoir [C. O.]; Rickmansworth [C. O.]; Park Street, St. Albans [C. O.]

KENT, EAST.—**EK.**

Deal [H. O.]; Marsh side, near Reculver [J. E. C.]

LANCASHIRE, MID.—**ML.**

Lytham [W. M. W.]

LANCASHIRE, SOUTH.—**SL.**

Hesketh Bank, Southport [A. S. K.]; Liverpool [H. O.]; Manchester [W. M. W.] [J. E. C.]; Swinton [T. R.]

LEICESTERSHIRE.—**LR.**

Staverton [A. S. K.]

LINCOLNSHIRE, NORTH.—**LN.**

Linwode [C. S. C.]; Newstead [C. S. C.]; North Somereotes [C. S.]

MIDDLESEX.—**MX.**

Bushey Park [J. E. C.]; Greenford [J. E. C.]; Harefield [J. E. C.]

NORTHAMPTONSHIRE.—**NO.**

Kettering (Hot water tank c. 70°) [C. E. W.]

OXFORDSHIRE.—**OX.**

Peasemore Piece, near Marston Copse [H. C. N.]

SOMERSETSHIRE, NORTH.—**NS.**

Clevedon & Kenn Moor [B.M. 53.12.6 : 42-52 & 1911. 10. 26 : 7663-80, 7893-7908].

**STAFFORDSHIRE.—ST.**

Gt. Barr Park [H. O.].

**SUFFOLK, EAST.—ES.**

Lowestoft [A. M.]; Mendlesham [A. M.]; Reydon Marsh, near Southwold [J. E. C.]; Walberswick [J. E. C.].

**SUFFOLK, WEST.—WS.**

Wyverstone [A. M.].

**SURREY.—SR.**

Chertsey Mead [B. B. W.]; Guildford [B. B. W.]; Thames at Richmond [W. M. W.]; Tooting [A. S. K.].

**SUSSEX, EAST.—EX.**

Bayham [A. S. K.]; Lewes [B.M. 1911. 10. 26: 7704-09].

**SUSSEX, WEST.—WX.**

Chidham [C. O.].

**WARWICKSHIRE.—WW.**

Sutton Coldfield district [H. O.].

**WESTMORLAND.—WL.**

Hampsfell, Grange (700') [J. W. J.].

**YORKSHIRE, MID-WEST.—MY.**

Beal [C. S.].

**YORKSHIRE, NORTH-WEST.—NY.**

Asenby [C. S.].

**YORKSHIRE, NORTH-EAST.—EY.**

Asenby [C. S.].

**YORKSHIRE, SOUTH-WEST.—WY.**

Beal [C. S.]; Huddersfield [B. B. W.].

**ISLE OF MAN.—IM.**

Near Ballaugh [F. T.].

## WALES.

**ANGLESEY.—A.**

Gaerwen [J. E. C.]; Rhosneigr [J. E. C.].

**BRECON.—BR.**

Llangorse [J. E. C.].

**CARNARVON.—CR.**

Criccieth [J. E. C.]; Llyn Ogwen (984') [C. O.].

**GLAMORGANSHIRE.—GM.**

Llandaff [B. B. W.].

**PEMBROKESHIRE.—PB.**

Tenby [W. M. W.] [B.M. 98. 6. 16: 13-42].

## SCOTLAND.

**DUMFRIES.—DF.**

Lochmaben [A. S. K.].

**HADDINGTONSHIRE.—HD.**

Luffness Links [C. S.].

**ISLAY, &c.—I.**

Colonsay [K. H. J.].

## IRELAND.

## ANTRIM.—AN.

Dum Bridge [J. N. M.]; Glenavy, R. [D. M.]; Glenshesk [D. M.]; Neagh, L. [C. O.] [D. M.].

## CLARE.—CL.

Goller Lake [R. A. P.]; Inishmore (Aran Is.) [R. A. P.].

## CORK, WEST.—WC.

Near More, L. [K. H. J.].

## DONEGAL, EAST.—ED.

Acapple, L. [H. T.]; Fad, L., Moville [J. N. M.]; Shivnagh, L. [H. T.]; Vearty, L. [H. T.].

## DONEGAL, WEST.—WD.

Fern, L. [J. N. M.]; Rossapenna [J. N. M.].

## DOWN.—DO.

Downpatrick (R. Quoyle) [D. M.]; Drum Bridge [J. N. M.].

## FERMANAGH.—FE.

Tully Lough [H. T.]; Tullyvogy, L. [H. T.]; Vearty, L. [H. T.].

## GALWAY, NORTH.—NG.

Ballindoolig [R. A. P.].

## GALWAY, SOUTH.—SG.

Ballinasloe [R. A. P.]; Portumna [R. A. P.]

## GALWAY, WEST.—WG.

Callow, L. [D. M.]; Inishbofin [A. W. S.].

## KERRY, SOUTH.—SK.

Dingle Promontory (Lakes 250'–3120') [A. W. S.]; Nagarriva, L. [A. W. S.].

## LONDONDERRY.—LD.

Walworth Wood [J. N. M.].

## MAYO, WEST.—WM.

Achill, I. [A. W. S.]; Belmullet peninsula [A. W. S.]; Clare, I. [A. W. S.]; Creevaghhaun, L., nr. Newport [A. W. S.]; Dooaghtry, L. [A. W. S.]; Mask, L. (120'–160') [A. S. K.].

## MONAGHAN.—MO.

Glaslough [D. M.]; Ross, L. [J. N. M.].

## ROSCOMMON.—RO.

Bushy Park [D. M.].

## WATERFORD.—WA.

Near Waterford [A. W. S.].

## WEXFORD.—WX.

Cahore [D. M.].

## FOSSIL.

## HOLOCENE.

## LONDON.—L.

Chingford [A. S. K.]; Westminster [A. S. K.].

## BERKSHIRE.—BK.

Newbury [A. S. K.] [B.M.—L. 13215].

**BUCKINGHAMSHIRE.—BX.**

Boveney [J. E. C.]; Princes Risborough [Prestwich Coll. : B.M.—L. 23958].

**HAMPSHIRE, SOUTH.—SH.**

Southampton Water [B.M.—L. 14971].

**KENT, EAST.—EK.**

Deal [A. S. K.].

**LANCASHIRE, MID.—ML.**

Hawes Water, Silverdale [J. W. J.].

**SUFFOLK, EAST.—ES.**

Blythburg [A. S. K.].

**SUFFOLK, WEST.—WS.**

Knettishall [A. S. K.].

**SURREY.—SR.**

Near Staines [A. S. K.].

## IRELAND.

**DOWN.—DO.**

Ballyfinder [A. S. K.]; Hillsborough [A. W. S.].

**FERMANAGH.—FE.**

Kilnamadoo [A. S. K.]; Magheragera [A. S. K.].

**GALWAY, SOUTH.—SG.**

Portumna [A. S. K.].

**MAYO, EAST.—EM.**

Lakelands [A. S. K.].

**MEATH.—ME.**

Mentrim, L. [A. S. K.].

## PLEISTOCENE.

**LONDON.—L.**

Angel Rd., Tottenham (Glacial) [A. S. K.]; Shacklewell Lane [Prestwich Coll., B.M.—L. 23975 very globose].

**MIDDLESEX.—MX.**

Ponder's End (Glacial) [A. S. K.].

**SUSSEX, WEST.—WX.**

West Wittering [A. S. K.].

*P. obtusale* is not well-known on the Continent. It has been seen from Iceland [F. H. Sikes Coll.], Scandinavia [Lynge Coll.], Bavaria [Norman Coll., B.M. 98.5.20 : 22268-71], Russia [Lindholm Coll.], Chamouni [Coll. Marquess de Monterosato—very dwarfed], and judging from Baudon's figures (9, pl. i, f. e) occurs in France. When better known it will probably prove to inhabit Europe north of the Alps.

Fossil it has been recorded from the Holocene and Pleistocene of Denmark [Johansen (85, p. 9)]: and recognized in the Pleistocene (Campinien and Hesbayen) of Soignes, Belgium [Mus. Hist. Nat. Brussels]. *P. fossile*, Sacco, from the Pliocene of Piedmont is closely allied.

17. **Pisidium vincentianum**, n. sp.

(Pls. II, f. 2; IV, f. 6; XXVII, f. 7-11.)

Testa parva, ovato-subtrigona, satis inaequilateralis, ventricosa, tenuissime striata, rugis incrementi elevatis hic illuc 4-5 praedita: superne rotundato-conica, umbonibus prominentibus, obtusissimis; antice prolongato-rotundata; postice truncato-rotundata; inferne arcuata. Cardine tenui, dentibus validis; ligamenti fossa brevis, maxime depressa, fere ad murum testæ apposita.

The detailed hinge characters are:—

*Hinge* (Pl. II, f. 2; IV, f. 6) about  $\frac{3}{4}$  the length of the shell, fairly wide, projecting somewhat inwards, and very strong, exceedingly arcuate, interrupted at ligament-pit which recedes back against the shell-wall.

R. V. *a. I.* about  $\frac{3}{8}$  the length of the hinge-line, narrow, strong, faintly curved inwards; *base* very strong and swollen; *apex* distal side of centre, not very prominent, obtuse-pointed; *ridges* fairly sharp, descending about equally and fairly steeply at first, then gradually.

*a. III.* about  $\frac{1}{4}$  the length of *a. I.*, to which it is parallel, narrow, straight, somewhat inclined against the shell-wall; *apex* near distal end, not very prominent, very obtuse; *ridges* sharp, sloping about equally.

*g.* very prominent, sickle-shaped, the rounded end, *b.*, sulcate and overhanging the inner margin of the hinge-plate.

*p. I.* about  $\frac{1}{4}$  the length of the hinge-line, narrow, strong, straight; *base* strong, somewhat swollen; *apex* central, moderately prominent, obtuse-pointed; *ridges* fairly sharp, sloping about equally and fairly steeply.

*p. III.* about  $\frac{1}{3}$  the length of *p. I.*, to which it is parallel, narrow, not very strong, straight, somewhat inclined against the shell-wall; *apex* obtuse-pointed; *ridges* sharp, sloping about equally and fairly steeply.

L. V. *a. II.* about  $\frac{3}{8}$  the length of the hinge-line, very narrow, strong, straight; *base* very strong and swollen; *apex* on distal side of centre, very prominent, obtusely acuminate; *ridges* sharp, sloping about equally and very steeply.

*2.* prominent, obtusely triangular, apex backwardly directed and pointing towards the umbo, base continuous with that of *a. II.*

*4.* lamelliform, sharp, prominent, seeming to spring from the shell-margin under the umbo, and curving gently backwards round *2* to about half across the hinge-plate.

*p. II.* about  $\frac{1}{4}$  the length of the hinge-line, very narrow, strong, straight; *base* strong, swollen; *apex* central, very prominent, obtusely acuminate; *ridges* sharp, umbonal

sloping fairly steeply to a point well below the general level of the hinge-plate and revealing the ligament-pit, distal ridge very steep at first, then sloping gradually.

*Dimensions* :—Long. 3·2, Alt. 2·7, Crass. 2 mm.

The specimens described come from the Pleistocene (Campinien) at Soignies, Belgium [Mus. Hist. Nat. Brussels], and were sent me with the other Belgian fossil species at the instance of Mons. E. Vincent, in honour of whom the species is named.

The marked feature of this unmistakable form is the extraordinary depression of the ligament-pit, which can only be properly seen when the hinge is viewed from across the ventral margin of the shell.

So far the only species seen at all resembling it is the living *P. stewarti*, Preston (140, p. 116), taken at an altitude of 14,500 feet at High Hill Gompa, Gyantse Valley, Tibet.

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# INDEX.

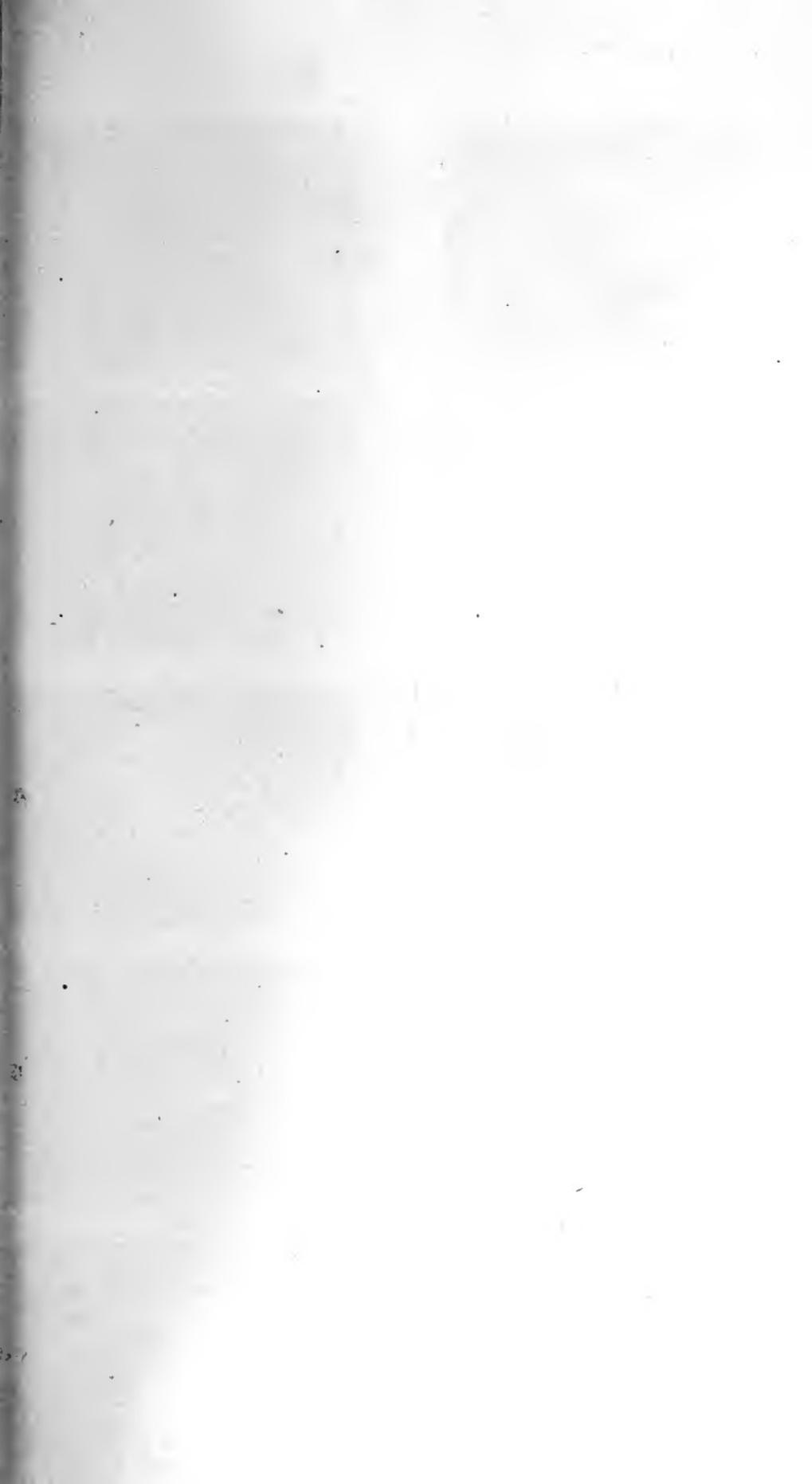
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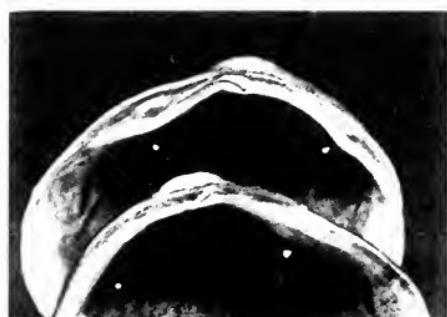
- acuminatum, 32.  
acuminatum, *P. fossarinum*  $\beta$ , 44.  
acutum, 13.  
aliena, 107.  
a.iennm, 16.  
*alligata*, *P. gassiesianum*, var. C,  
    70.  
*alligatum*, *P. pusillum*,  $\delta$ , 70.  
alpicola, 111, 116.  
amnia, *Cyclas*, 1.  
amnica, *Cordula*, 16.  
amnica, *Corneocyclas*, 16.  
amnica, *Cyclas*, 16.  
amnica, *Pera*, 16.  
amnica, *Tellina*, 16.  
amnicum, 3, 5, 6, 7, 8, 9, 10, 11,  
    12, 13, 15, **16-27**, 29, 60, 93.  
amnicum, var. *danubialis*, 16, 19.  
amnicum, var. B, *nitida*, 31, 32.  
amnicum, var. *nova*, 16.  
amnicum, var. *sulcatum*, 27.  
amnicum, *Cardium*, 16.  
amnicum, *Musculium*, 16.  
amnicum, *Pisum*, 16.  
amnicum, *Tellina*, 6.  
antiquum, 12, 27, 31.  
*appendiculata*, *Cyclas*, 13, 93.  
*appendiculata*, *Pera*, 93.  
arciforme, 9, 70.  
arcticum, 33.  
asperi, 13.  
asperi, *P. milium*, var., 13.  
*astartoides*, 3, 6, 12, 18, **27-31**.  
*australe*, *Musculium*, 32.  
*australe*, *Pisum*, 32.  
  
*baicalense*, 16, 27.  
*barbozanum*, 13.  
*bartolomaeum*, 84.  
*baudonianum*, 70.  
  
*baudonii*, 100.  
*bonnafouxianum*, 100.  
*boreale*, 33.  
  
*caliculatum*, 31.  
*canariense*, 13.  
*capellinii*, 44.  
*casertana*, *P. pusillum*, var., 32.  
*casertanum*, 2, 6, 9, 10, 12, 13, 15,  
    19, **31-44**, 46, 47, 54, 55, 62, 84,  
    102, 109, 119.  
*casertanum*, var. *bonnafouxianum*,  
    100.  
*casertanum*, var. *gassiesianum*,  
    70.  
*casertanum*, var. G, *globulosum*,  
    119.  
*casertanum*, var. *jaudouinianum*,  
    100.  
*casertanum*, var. B, *limosum*, 32.  
*casertanum*, *Cardium*, 6, 31.  
*casertanum*, *Musculium*, 32.  
*casertanum*, *Pisum*, 32.  
*cazertanum*, 32.  
*cazertanum*,  $\eta$ , *gassiesianum*, 70.  
*cazertanum*,  $\epsilon$ , *normandium*, 70.  
*cazertanum*, var.  $\gamma$ , *thermale*, 60.  
*charpentieri*, 13.  
*cinerea*, *P. fontinale*, var., 32.  
*cinerea*, *P. henslowianum*, var., 32.  
*cinerea*, *Cyclas*, 31.  
*cinereum*, 6, 7, 8, 9, 10, 11, 12, 31,  
    32, 36.  
*clessini*, 53, 59, 60, 69.  
*colbeau*i**, 13.  
*conicum*, 10, 100.  
*conventus*, 13.  
*Cordula*, 2.  
*Corneocyclas*, 1.  
*costulatum*, 85, 111.

- creplini, 13.  
 cuneatum, 32.  
 curtum, P. fontinale, var., 53.  
 curtum, P. fossarinum, var., 53.  
 dabneyi, 13.  
 danubiale, 16.  
 ddingoli, 13.  
 demissum, 13.  
 depressum, 16.  
 dubia, *Cyclas*, 1, 2.  
 dubium, 33, 44.  
 dubrueili, 13.  
 duplicatum, 13.  
 dupuyanum, 84.  
 elongata, P. amnicum, var., 16, 19.  
 elongatum, 16.  
*Euglesa*, 2.  
 Fluminina, 5.  
 fluviatilis, Pera, 16.  
 fontinale, 7, 9, 11, 12, 13, 33, 85.  
 fontinale, var. ?, 107.  
 fontinale, var. cinerea, 32.  
 fontinale, var. curtum, 53.  
 fontinale, var. henslowana, 93.  
 fontinale, var. obtusale, 119.  
 fontinale, var. pallida, 84.  
 fontinale, var. pulchella, 78.  
 fontinalis, *Cyclas*, 1, 6, 7, 13, 60,  
     84.  
 fontinalis, *Cyclas*, var. B, obtusalis,  
     119.  
 foreli, 14.  
 Fossarina, 5.  
 fossarinum, 32.  
 fossarinum,  $\beta$ , acuminatum, 44.  
 fossarinum, var. curtum, 53.  
 fossile, 126.  
 fragillum, 14.  
 fuscum, 14.  
 futtereri, 14.  
 Galileia, 2.  
 gassiesianum, 10, 11, 70.  
 gassiesianum, var. C, alligata, 70.  
 gibba, 7.  
 gibba, *Cyclas*, 60.  
 gibba, Pera, 100, 110.  
 globosa, P. nitidum, var., 11.  
 globulare, 107, 108, 109.  
 globulosum, 119.  
 granum, 44, 52.  
 grateloupianum, 32.  
 gratelupeanum, 32.  
 heldrichii, 33.  
 henslowana, *Tellina*, 7, 93.  
 henslowanum, 6, 9, 10, 13, 15, 85,  
     86, 93-100, 102.  
 henslowanum,  $\epsilon$ , dupuyanum, 84.  
 henslowanum, var.  $\beta$ , normale,  
     100.  
 henslowanum,  $\gamma$ , pallidum, 84.  
 henslowanum, var.  $\beta$ , supinum,  
     100.  
 henslowiana, Pera, 16.  
 henslowianum, 7, 9, 10, 11, 12,  
     93.  
 henslowianum, var. B, 84.  
 henslowianum,  $\delta$ , bonnafouxianum,  
     100.  
 henslowianum, var. cinerea, 32.  
 henslowianum,  $\zeta$ , jaudouinianum,  
     100.  
 henslowianum, var. pulchellum,  
     78.  
 henslowianum, *Corneocyclas*, 93.  
 henslowianum, *Euglesa*, 60.  
 henslowianum, *Musculium*, 93.  
 henslowianum, *Pisum*, 93.  
 henslowianum, *Trepidocyclas*, 93.  
 herminii, 33.  
 hibernicum, 6, 12, 116-119.  
 hispanicum, 33.  
 hoyeri, 107.  
 ibericum, 32.  
 imbutum, 14.  
 imhofi, 14.  
 impar, 33.  
 incertum, 44.  
 inflatum, 16.  
 intermedium, 16, 31, 32.  
 iratianum, 32.  
 italicum, 33.  
 jaudouinianum, 100.  
 jenynsii, 8, 9, 14, 84.  
 joannis, 8, 14.  
 korotnevi, 107, 111.  
 kükenurense, 14.  
 lacustris, *Cyclas*, 2.  
 lateumbonatum, 14.  
 lenticulare, 32.  
 lenticulare, *Musculium*, 32.  
 lenticulare, *Pisum*, 32.  
 lenticularis, *Cyclas*, 31.  
 lilljeborgii, 6, 12, 80, 107, 109,  
     111-116, 119.  
 limosum, 31.

- limosum, *P. casertanum*, var. *B*, 32.  
*lindstroemi*, 33.  
*loveni*, 111, 116.  
*luganense*, 14.  
*lumstenianum*, 14.  
*maculatum*, 33.  
*miliolum*, 14.  
*milium*, 6, 7, 8, 9, 10, 11, 12, 70-78, 79, 119.  
*milium*, var. *asperi*, 13.  
*milium*, var. *normandianum*, 60.  
*minima*, *Cyclas*, 14.  
*minimum*, 14.  
*moitessierianum*, 100.  
*moreanum*, 33.  
*moussonianum*, 14.  
*mucronatum*, 93.  
*Musculium*, 2.  
*nitida*, *P. amnicum*, var. *B*, 31, 32.  
*nitida*, *Cyclas*, 44.  
*nitidum*, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 19, 35, 44-52, 54, 62, 80, 86, 109, 119, 120.  
*nitidum*, var. *globosa*, 122.  
*nitidum*, var. *splendens*, 53, 78, 111.  
*nitidum*, *Musculium*, 44.  
*nitidum*, *Pisum*, 44.  
*nordenskiöldi*, 33.  
*nordenskiöldi*, var. *semenkevitschi*, 111, 116.  
*normale*, *P. henslowanum*, var.  $\beta$ , 100.  
*normandianum*, 79.  
*normandianum*, *P. milium*, var., 60.  
*nova*, *P. amnicum*, var., 16, 18, 19.  
*nucleatum*, 33.  
*nucleus*, *P. henslowianum*, var., 93.  
*obliqua*, *Cyclas*, 6, 16.  
*obliquatum*, 14, 32.  
*obliquum*, 7, 13, 16.  
*obtusale*, 5, 6, 7, 10, 11, 12, 14, 100, 103, 119-126.  
*obtusale*, var. *personatum*, 53.  
*obtusale*, *Musculium*, 119.  
*obtusale*, *Pisum*, 119.  
*obtusalis*, *P. pusillum*, var., 44.  
*obtusalis*, *Cyclas*, 6, 84, 119.  
*obtusatum*, 14.  
*occupatum*, 14, 15.  
*olivetorum*, 14.  
*ovale*, 14.  
*ovatum*, 33.  
*pallida*, *P. fontinale*, var., 84.  
*pallidum*, 32.  
*pallidum*, *P. henslowanum*,  $\gamma$ , 84.  
*palustris*, *Cyclas*, 6, 16.  
*parvulum*, 6, 105-107.  
*Pera*, 2.  
*personatum*, 2, 6, 7, 9, 11, 14, 15, 35, 44, 46, 47, 53-59, 62, 63.  
*Phy wholeoda*, 2.  
*piattii*, 14.  
*pileus*, 44.  
*Pisidium*, 1.  
*Pisum*, 2.  
*poultoni*, 85.  
*prisca*, *Cyclas*, 31.  
*priscum*, 32.  
*profundum*, 15.  
*prolongatum*, 15.  
*pulchella*, *P. fontinale*, var., 78.  
*pulchella*, *Cyclas*, 78.  
*pulchella*, *Pera*, 78.  
*pulchellum*, 6, 7, 8, 9, 10, 11, 12, 15, 32, 33, 60, 78-84, 103.  
*pulchellum*, vars.  $\beta$  &  $\gamma$ , 84.  
*pulchellum*, var.  $\delta$ , 70, 72.  
*pulchellum*, *Pisum*, 78.  
*pusilla*, *Corneocyclas*, 60.  
*pusilla*, *Cyclas*, 60.  
*pusilla*, *Tellina*, 2, 6, 60.  
*pusillum*, 6, 7, 8, 9, 10, 11, 12, 15, 44, 46, 47, 54, 60-69, 107, 109.  
*pusillum*,  $\delta$ , *alligata*, 70.  
*pusillum*, var. *casertana*, 32.  
*pusillum*, var. *obtusalis*, 44, 119.  
*pusillum*,  $\epsilon$ , *quadrilaterum*, 70.  
*pusillum*, *Musculium*, 60.  
*pusillum*, *Pisum*, 60.  
*quadrangulum*, 15.  
*quadrilaterum*, *P. pusillum*, var., 70.  
*raddei*, 119.  
*rambottianum*, 15.  
*reclusianum*, 9, 15.  
*recluzianum*, 15.  
*rivalis*, *Tellina*, 16.  
*rivulare*, 33.  
*Rivulina*, 5.  
*roseum*, 11, 12, 31, 70.  
*roseum*, *Musculium*, 32.  
*roseum*, *Pisum*, 32.  
*rotundum*, 15.  
*schmidti*, 15.

- scholtzii, 119.  
 scholtzii, Corneocyclas, 119.  
 semenkevitschi, *P. nordenskiöldi*,  
     var., 111, 116.  
 sibiricum, 33.  
 sinuatum, 15.  
 sordellianum, 33.  
 sphæriiforme, 44.  
 splendens, *P. nitidum*, var., 53, 78,  
     111.  
 steenbuchii, 6, 8, **107-111**, 115.  
 steenbuchii, *Cyclas*, 107.  
 steenbuchii, *Sphaerium*, 107.  
 stewarti, 128.  
 studeri, 15.  
 submersum, 15.  
 subtilestriatum, 16, 19, 27.  
 subtruncatum, 6, 7, 8, 9, 10, 15,  
     19, 79, **84-93**, 95, 119.  
 sulcatum, 16, 27.  
 supinoides, 100.  
 supinum, 5, 6, 9, 10, 36, 95, **100-**  
     **105**, 107.  
 supinum, *Musculium*, 100.  
 supinum, *Pisum*, 100.  
 targionianus, 33.  
 tenebrosa, *Galileia*, 2, 31.  
 tenebrosa, *Musculium*, 32.  
 tetragonum, 70.  
 thermale, 32.  
 thermale, *P. casertanum*, var. ν,  
     60.  
 tornense, 60.  
 transversale, *P. lilljeborgii*, var.,  
     113.  
 transversum, 16.  
 trigonoides, 33.  
 trigonum, 100.  
 tritonis, 15.  
 tumidum, 85.  
 turanicum, 84.  
 urinator, 15.  
 vincentianum, 6, **127-128**.  
 virginica, *Tellina*, 2.  
 vitrea, *Cyclas*, 31.  
 vitreum, 31.  
 vitreum, *Musculium*, 32.  
 vitreum, *Pisum*, 32.  
 watsoni, 15.  
 xantholenum, 33.





## EXPLANATION OF PLATES.

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### PLATE I.

Diagrammatic Enlargements of the Hinges of:—

1. *Pisidium amnicum.*
2. —— *astartoides.*
3. —— *casertanum.*
4. —— —— from Caserta.
5. —— —— [= *P. fossarinum*, Clessin].
6. —— —— ; lake, or still-water form.
7. —— *personatum.*
8. —— *pusillum.*
9. —— *nitidum.*
10. —— *milium.*

(Figs. 2 & 3 have been only slightly “ touched.”)

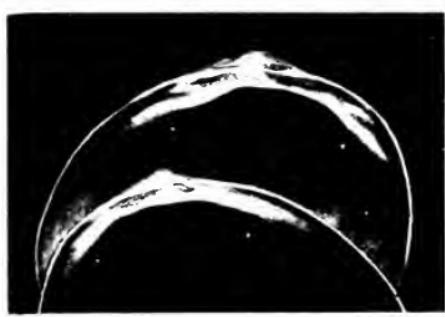
In the above Plate the white dots are placed opposite the apices of the inner lateral teeth, and in fig. 7 the two white lines point towards the callus.

## PLATE II.

Diagrammatic Enlargements of the Hinges of:—

1. *Pisidium pulchellum.*
2. — *vincentianum.*
3. — *subtruncatum.*
4. — *henslowanum.*
5. — *supinum.*
6. — *parvulum.*
7. — *steenbuchii.*
8. — *lilljeborgii.*
9. — *hibernicum.*
10. — *obtusale.*

In the above Plate the white dots are placed opposite the apices of the inner lateral teeth.

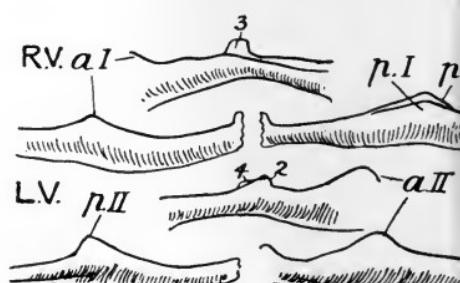
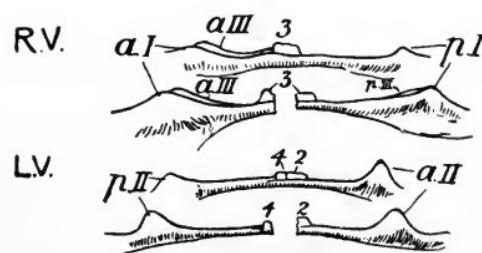
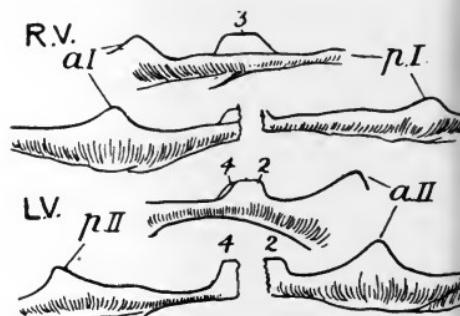
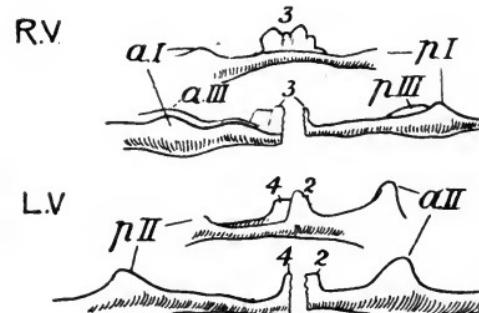
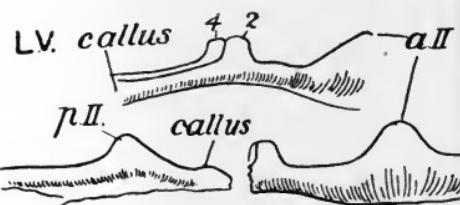
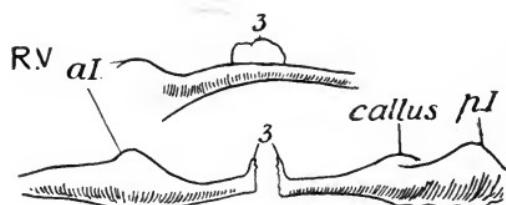
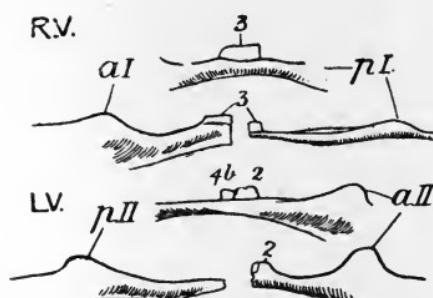
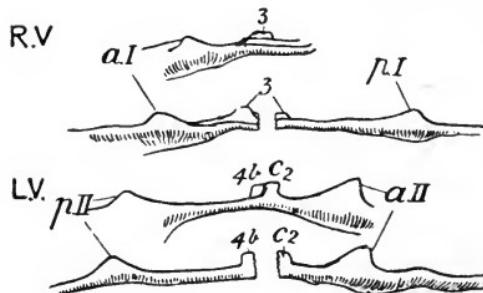
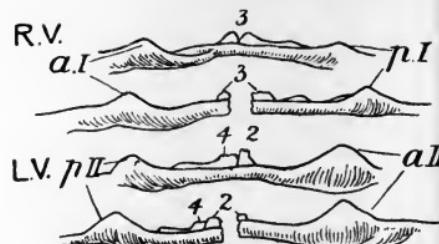
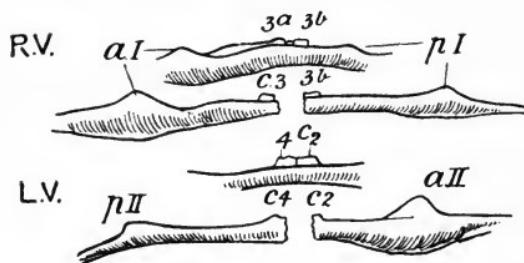






Cat. Pisidium Brit. Mus.

Pl. III.



### PLATE III.

Ventral aspect of Hinges, drawn by camera lucida, of :—

1. *Pisidium amnicum.*
2. —— *astartoides.*
3. —— *casertanum.*
4. —— *pusillum.*
5. —— *personatum.*
6. —— *nitidum.*
7. —— *subtruncatum.*
8. —— *pulchellum.*
9. —— *henslowanum.*

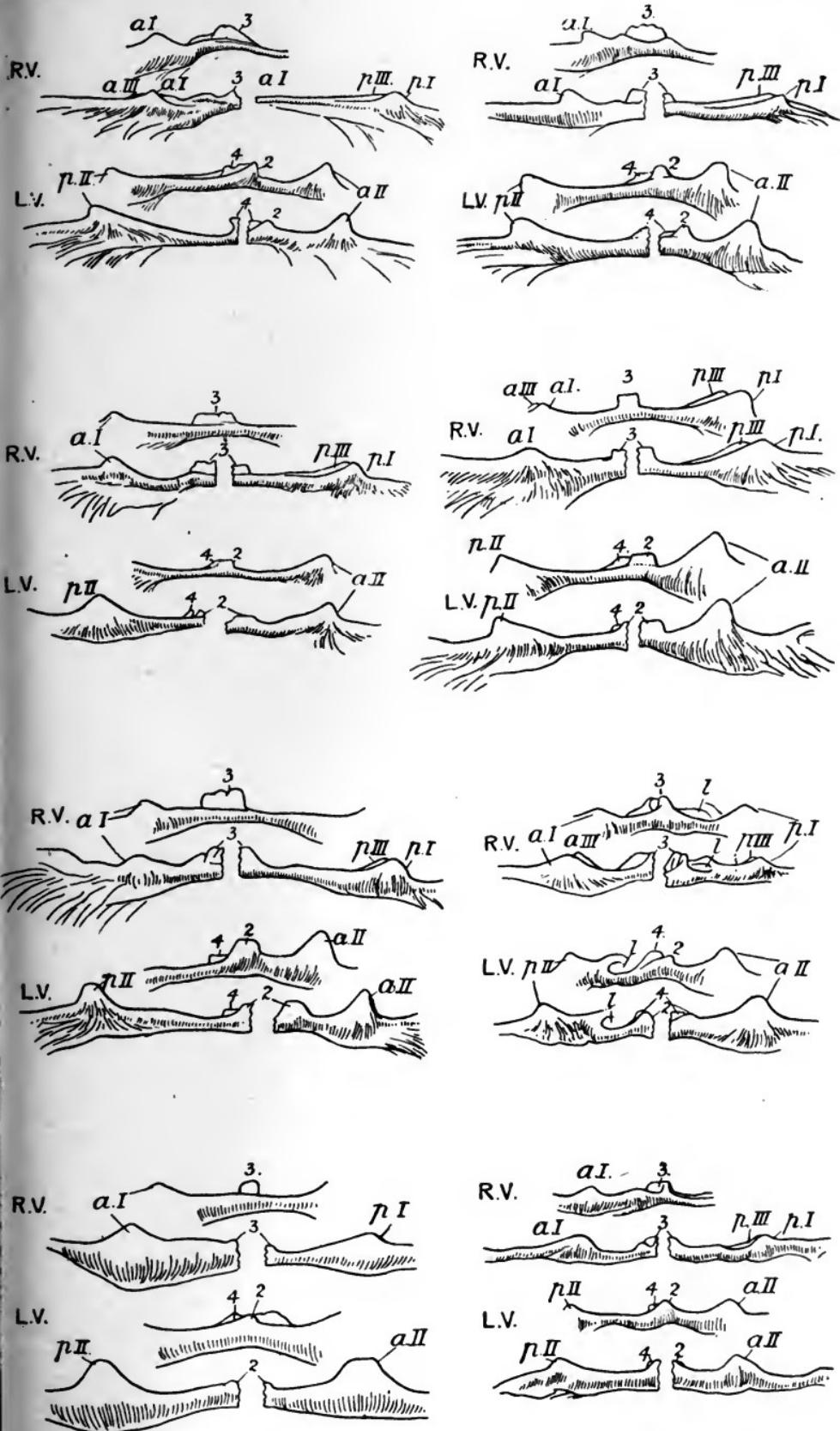
#### PLATE IV.

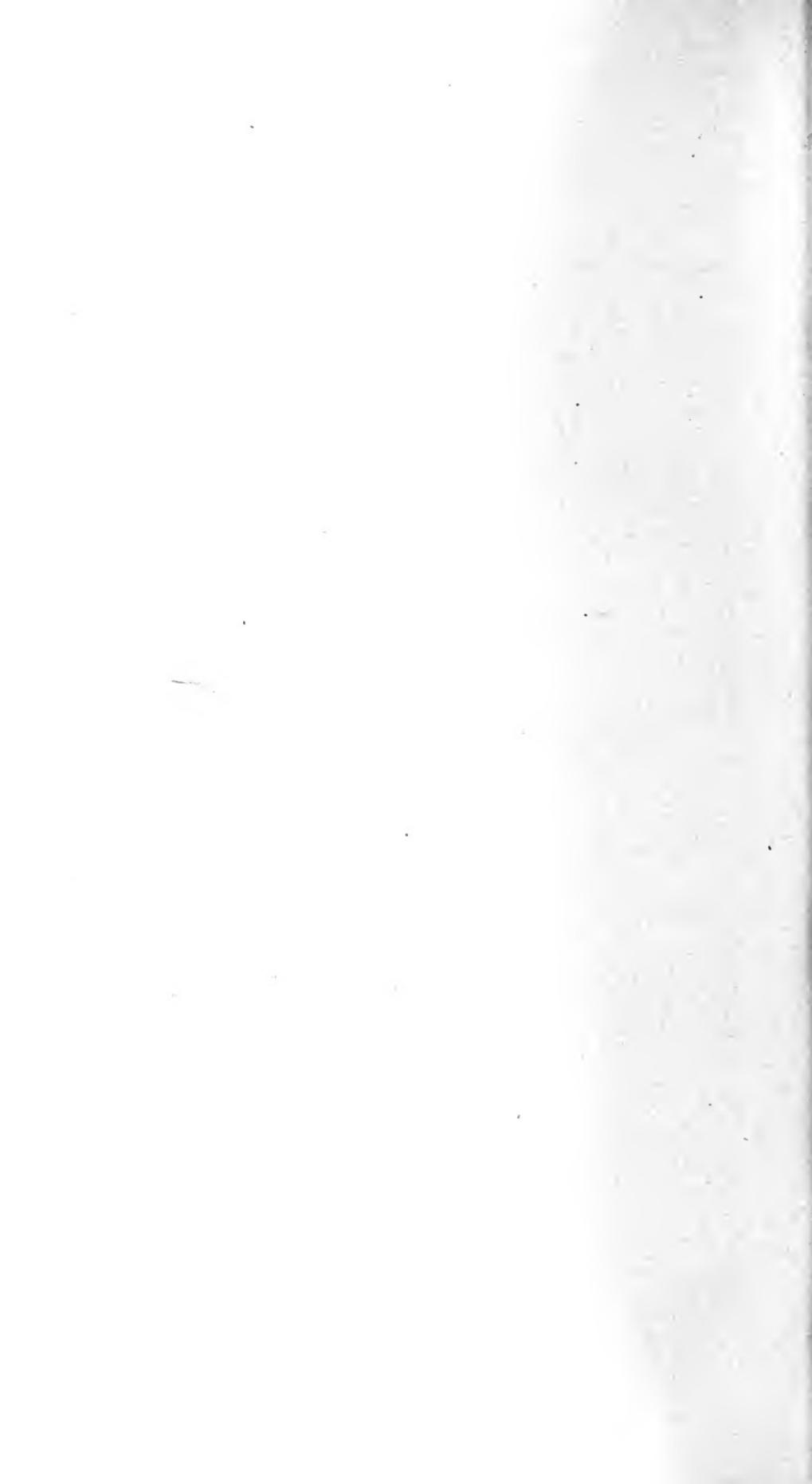
Ventral aspect of Hinges, drawn by camera lucida, of :—

1. *Pisidium steenbuchii.*
2. —— *lilljeborgii.*
3. —— *milium.*
4. —— *obtusale.*
5. —— *hibernicum.*
6. —— *vincentianum.*
7. —— *supinum.*
8. —— *parvulum.*

Cat. *Pisidium* Brit. Mus.

Pl. IV.







## PLATE V.

## PISIDIUM AMNICUM (Müller).

1. *a, b.* Posterior and dorsal view of a pair from the Regent's Canal, N.W. London.
2. *a, b.* —— of a pair from the Thames at Hampton Wick, Middlesex.
3. *a, b.* —— of a pair from the Bolton Canal, Lancashire.
4. *a, b.* —— of a pair } from the Pleistocene at Crayford.
4. *c, d.* —— of a right valve } Erith, Kent.
5. *a, b.* —— of a pair from the Cromerian at West Runton, Norfolk.
6. *a, b.* —— of a pair from the Pleistocene at Barnwell Abbey, Cambridgeshire.
7. *a, b.* —— of left valve of "var. *danubialis*" from the Pleistocene at Crayford-Erith, Kent.
8. *a, b.* —— of right valve of the same from the Pleistocene at Grays, Essex.
9. *a, b.* —— of a left valve of a strongly striate example from the Pleistocene at Grays, Essex. (*P. sulcatum*, *paris*, of S. P. Woodward's coll.)
11. *a-f.* External left aspect of a series of different ages from the Thames at Hampton Wick, Middlesex.
12. *a-d.* —— of young shells from Newton Abbott, Devon.
13. External right aspect of adult shell from the Regent's Canal, N.W. London.
14. External left aspect of adult shell from the Bolton Canal, Lancashire.
15. External right aspect of adult shell from the Thames at Hampton Wick, Middlesex.
16. —— from the Spandauer Canal, Berlin. ("Var. *elongata*.")
17. *a-d.* External right aspect of a series of different ages of "var. *nova*, Paul.", from St. Canzian, Croatia.
18. —— of adult shell from the Coln at West Drayton, Middlesex.

## PISIDIUM ASTARTOIDES, Sandbergeri.

10. *a, b.* Posterior and dorsal view of a left valve from the Pleistocene at Grays, Essex. (*P. sulcatum*; *paris*, of S. P. Woodward's coll.)

\* \* \* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.

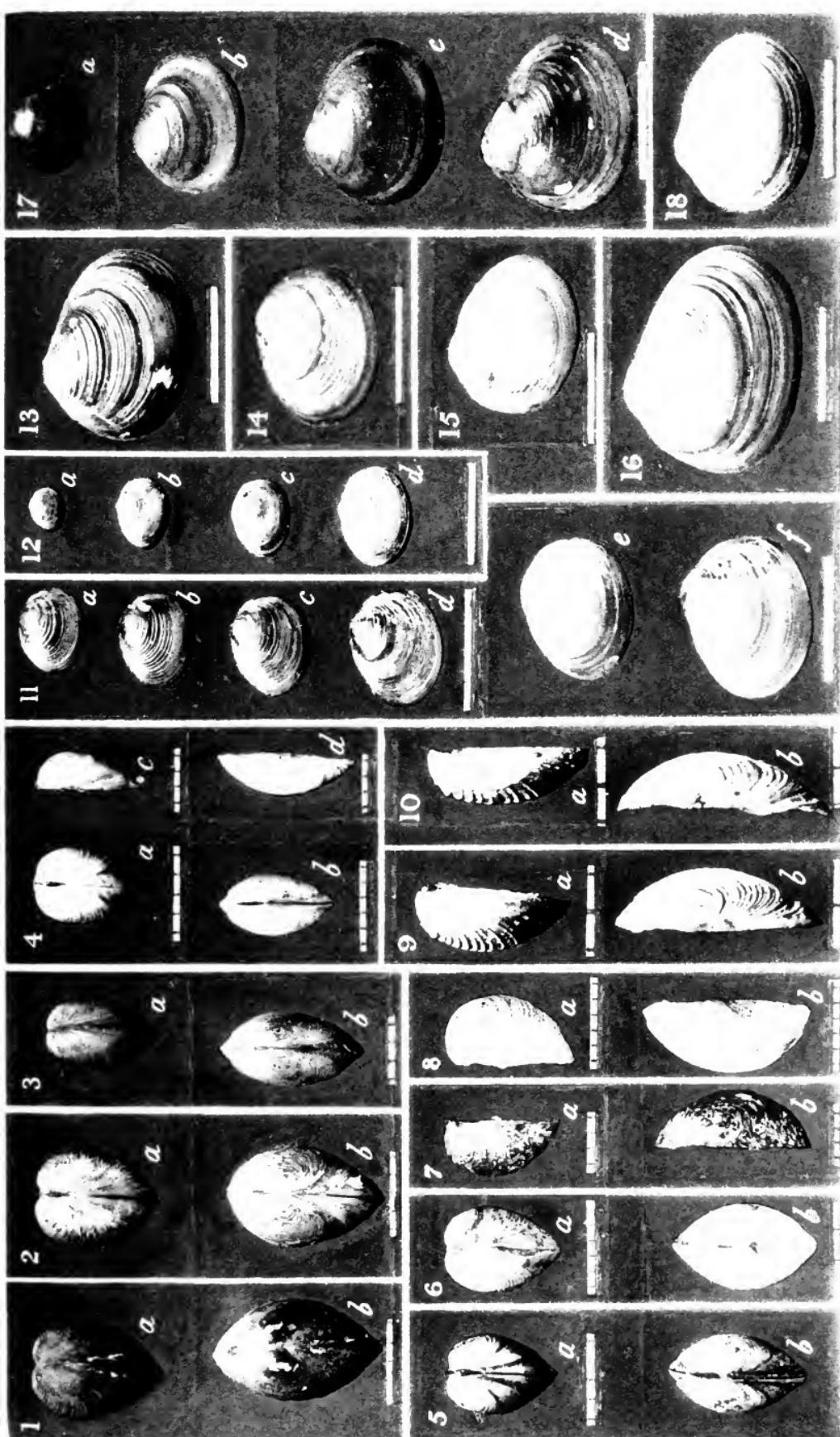




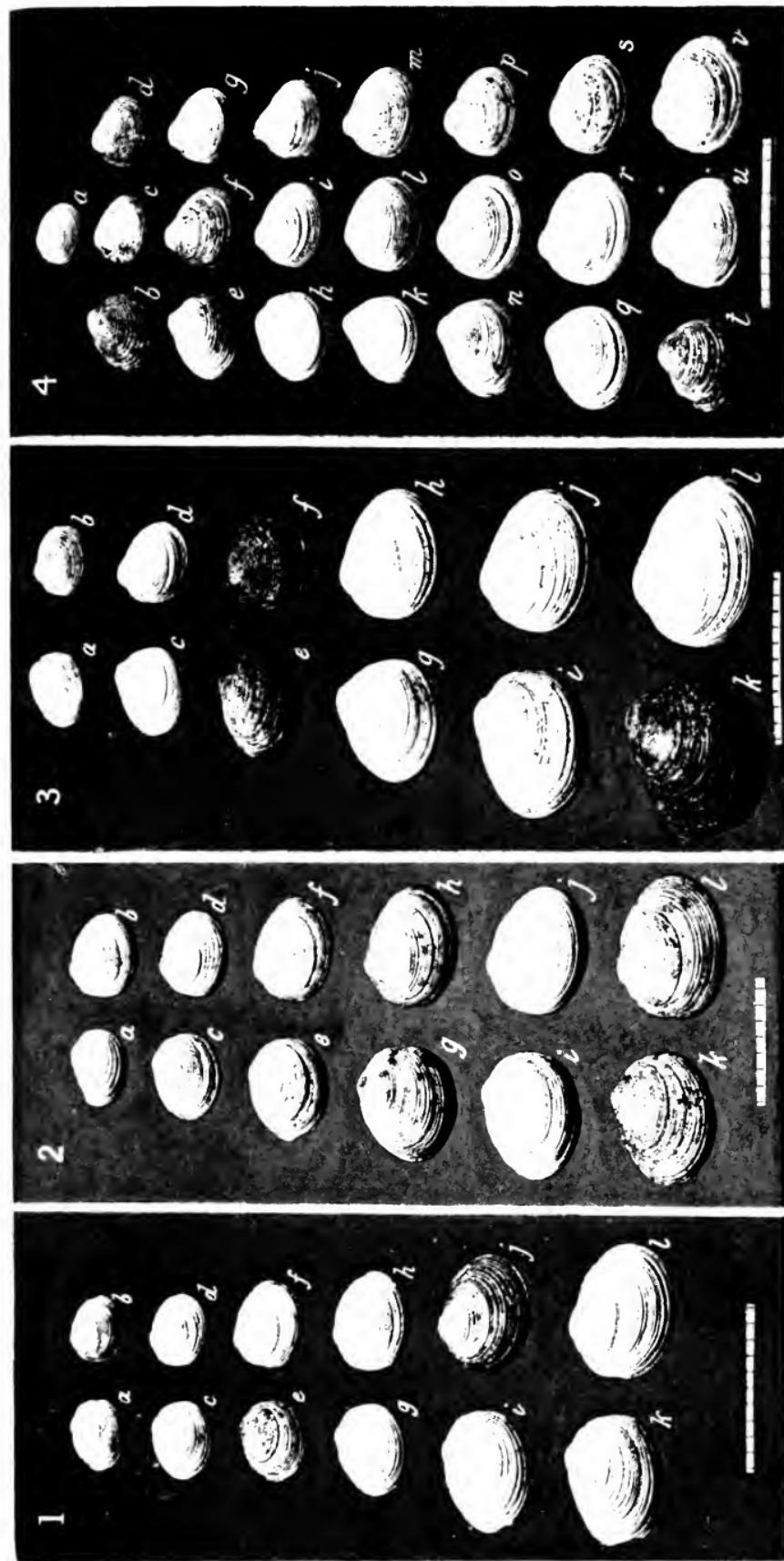


PLATE VI.

PISIDIUM AMNICUM (Müller).

1. *a-l.* External aspect of a series of valves of all ages from the Pleistocene at Grays, Essex. Typical form.
2. *a-l.* — Form verging towards "var. *danubialis*," from the same locality and formation.
3. *a-l.* — of "var. *danubialis*," from the same locality and formation.
4. *a-v.* — showing transition into the small trigonal form, from the same locality and formation.

\* \* \* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.





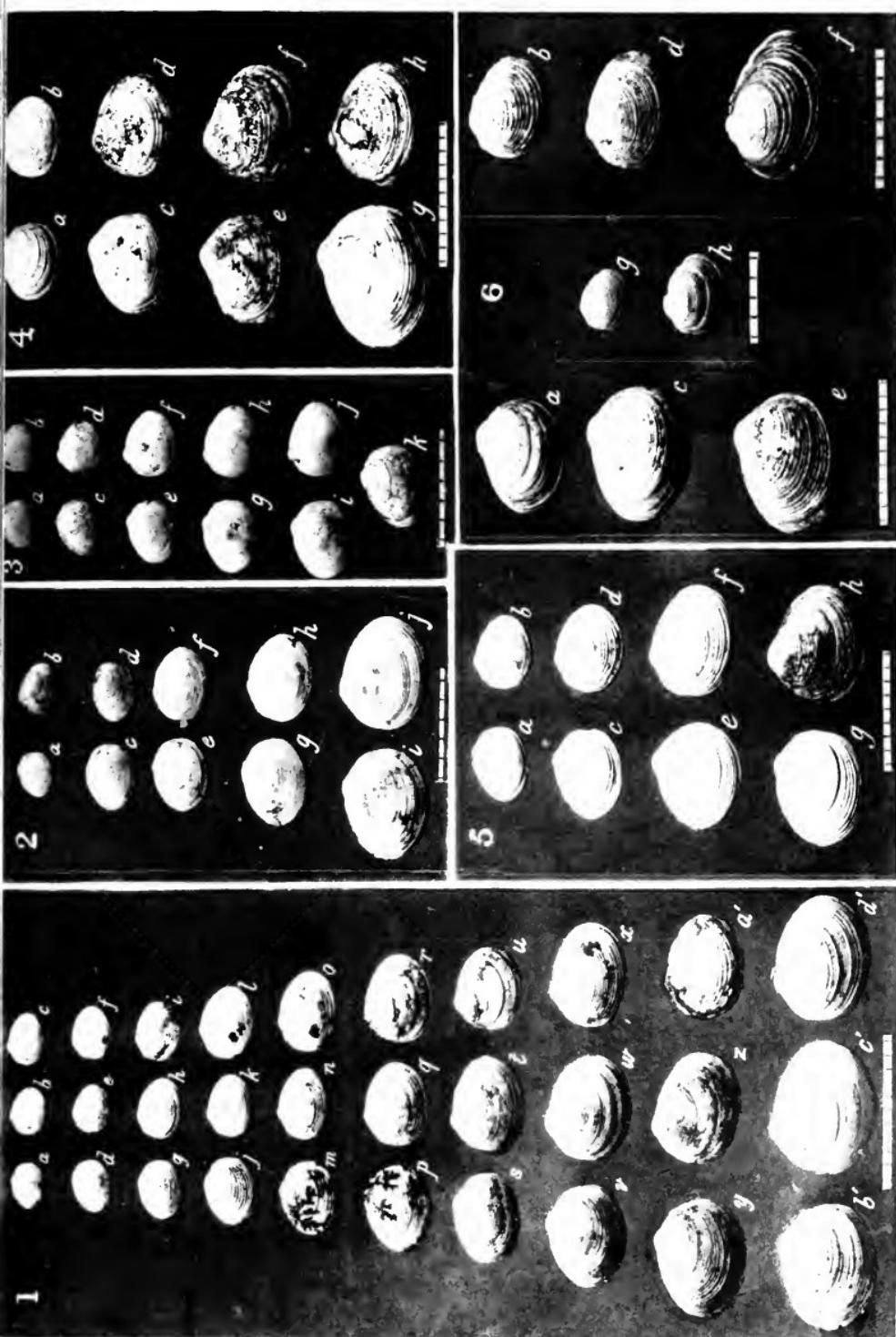


## PLATE VII.

### PISIDIUM AMNICUM (Müller).

1. *a-d'*. External aspect of a series of valves of all ages from the Pleistocene of Crayford-Erith. Typical form.  
[*1 m & p* show the dendritic markings characteristic of this deposit. *1 s* is an example of one of the fractured and repaired valves that are frequent.]
2. *a-j.* — still younger specimens more highly magnified, from the same locality and formation.
3. *a-k.* — very young forms of "var. *danubialis*," from the same locality and formation.
4. *a-h.* — larger examples of that variety, from the same locality and formation.
5. *a-h.* — from the Pleistocene at Swanscombe, Kent. Form intermediate between the type and "var. *danubialis*."
6. *a-f.* — from the Cromerian at West Runton, Norfolk. Typical form.

\*.\* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.



187

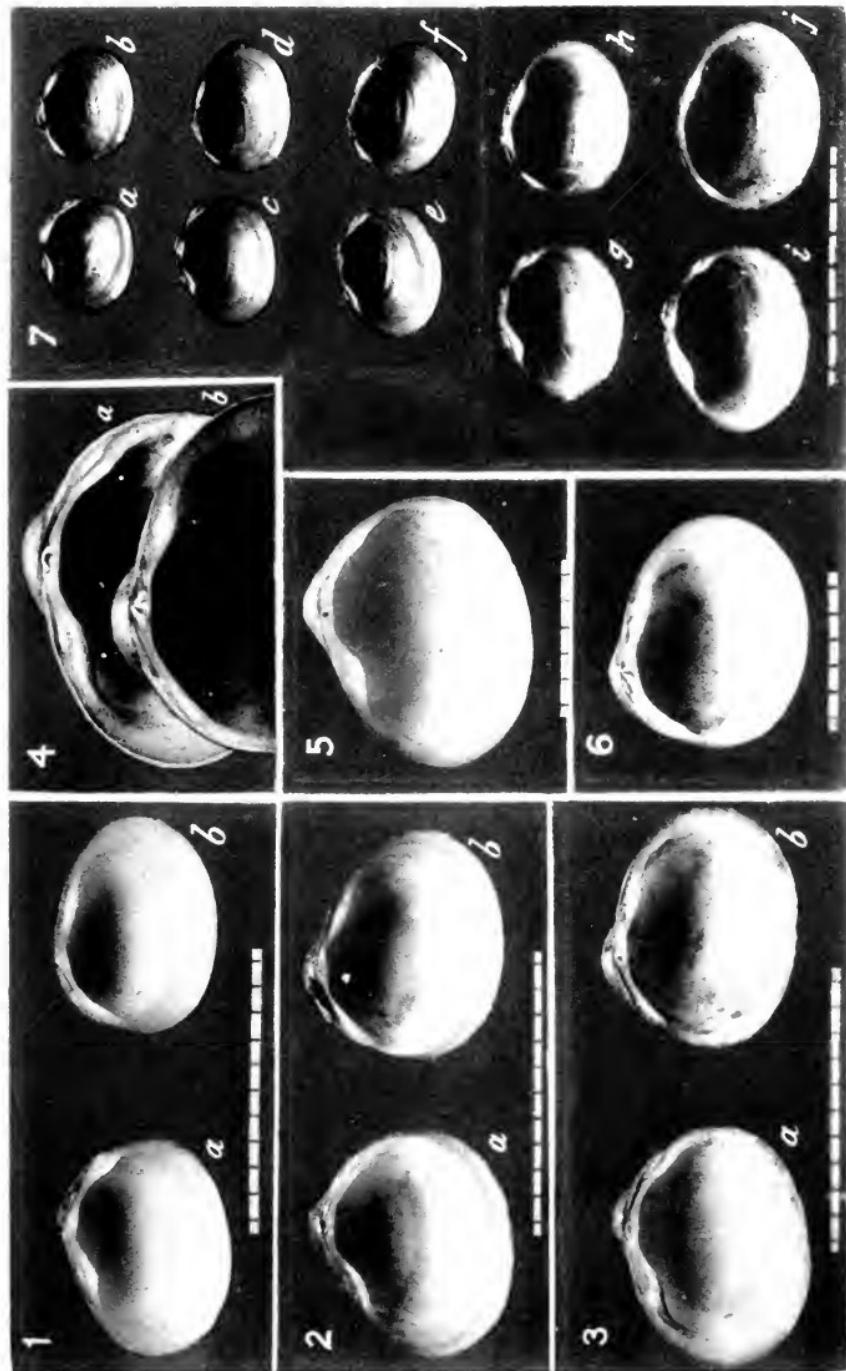


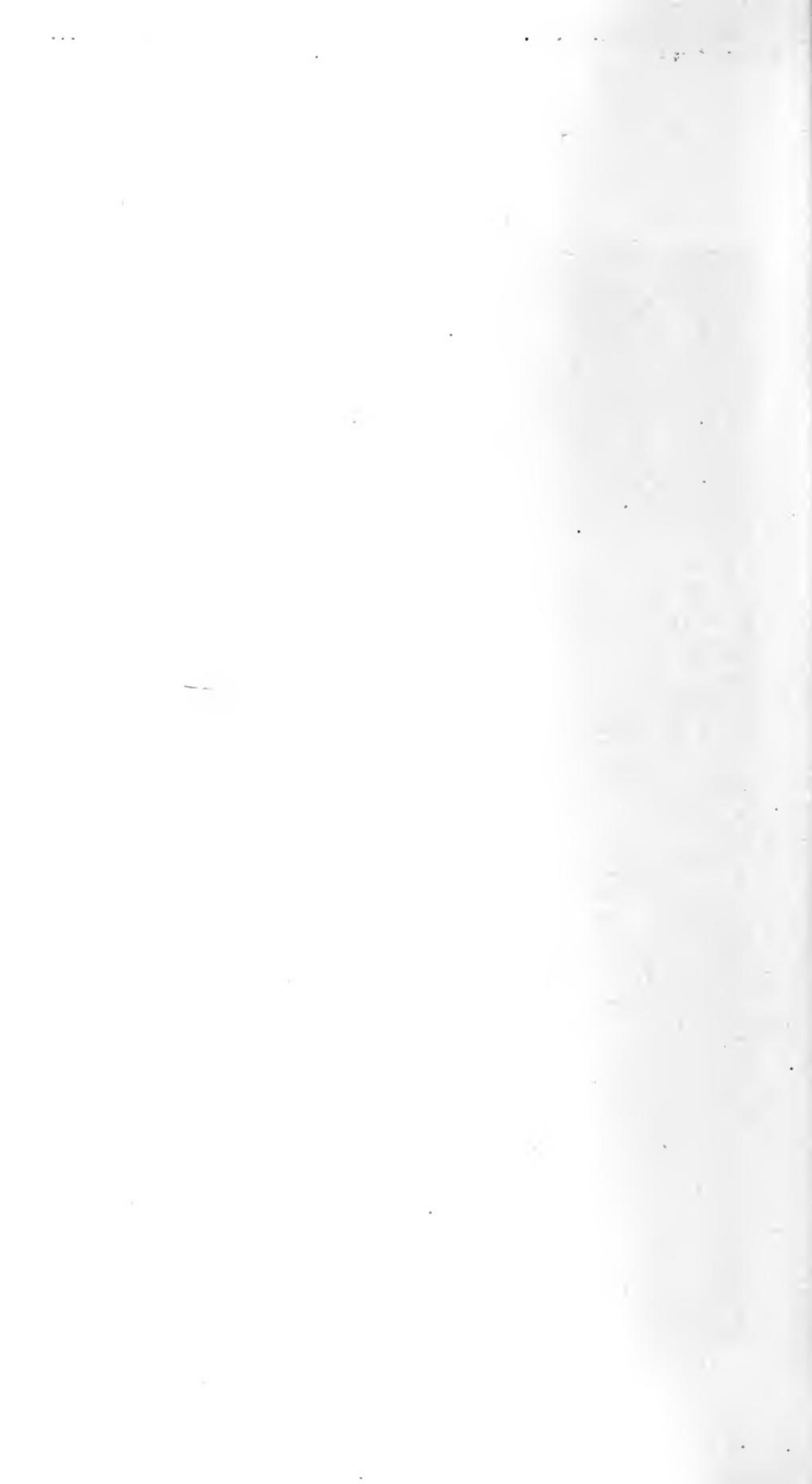
## PLATE VIII.

### PISIDIUM AMNICUM (Müller).

1. *a, b.* Internal aspect of adult pair from the Thames at Hampton Wick, Middlesex.
2. *a, b.* —— of "var. *nova*, Paul.," from St. Canzian, Croatia.
3. *a, b.* —— of adult pair from the Coln at West Drayton, Middlesex.
4. *a, b.* Diagrammatic enlargement of the Hinge.
5. Internal aspect of adult right valve, from Doubs.
6. —— of adult left valve of "var. *danubialis*," from Vienna.
7. *a-j.* —— of a series of pairs of different ages from the Thames at Hampton Wick, Middlesex.

\*.\* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.







## PLATE IX.

### *PISIDIUM AMNICUM* (Müller).

1. *a-f.* Internal aspect of a series of adult valves, showing variation in outline, of the typical form from the Pleistocene at Crayford-Erith, Kent.
  2. *a-h.* —— of the "var. *danubialis*" from the Pleistocene at Grays, Essex.
  3. *a-f.* } —— of young valves of the typical form, from the
  4. *a-f.* } —— Pleistocene at Crayford-Erith, Kent.
  5. *a-f.* }
  6. *a-e.* }
  7. *a-d.* } —— of the young valves of the "var. *danubialis*," from the Pleistocene at Crayford-Erith, Kent.
- [7 *c* contains an attached Pearl: the only instance met with.]
8. *a, b.* —— of two adult valves of the intermediate form, from the Cromerian at West Runton, Norfolk.
  9. *a-f.* —— of a series of valves of the extremely triangular form, from the Pleistocene at Grays, Essex.

\* \* \* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.

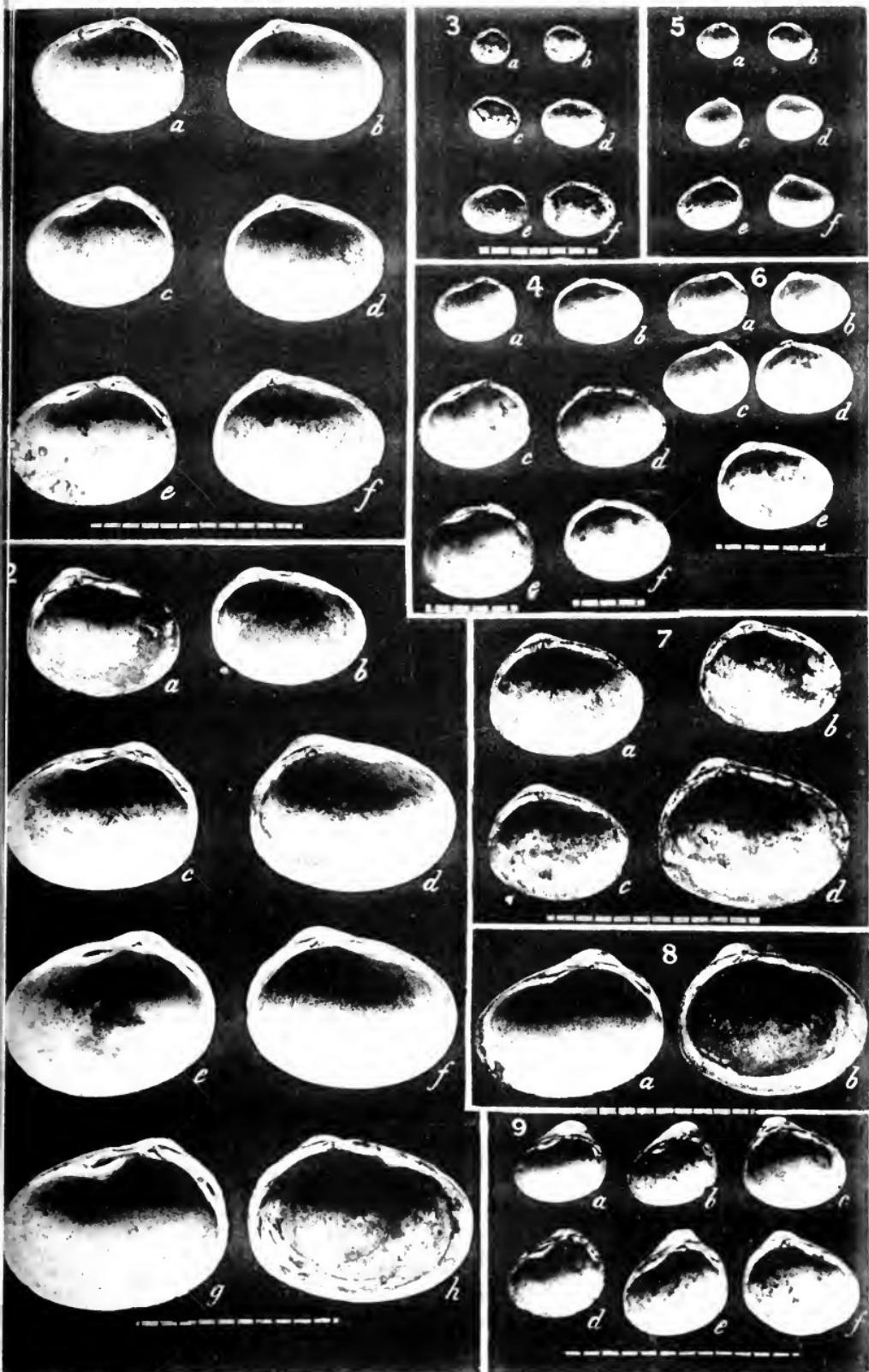




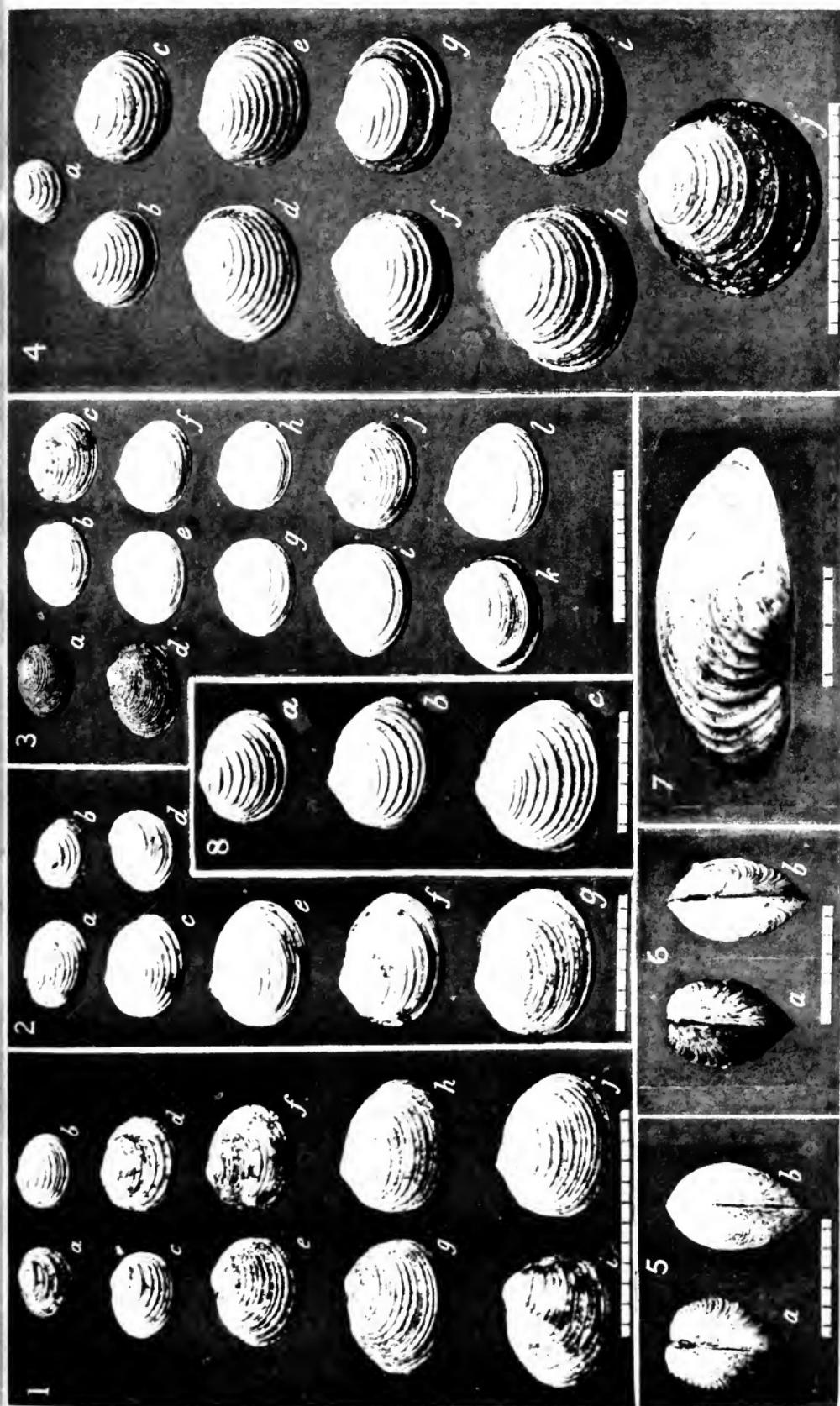


PLATE X.

*PISIDIUM ASTARTOIDES*, Sandberger.

1. *a-j.* External aspect of a series of valves of different ages, showing variation in outline and sculpture, from the Pleistocene at Crayford-Erith, Kent.
2. *a-g.* —— from the Pleistocene at Clacton, Essex.
3. *a-l.* —— from the Pleistocene at Grays, Essex.
4. *a-j.* —— from the Cromerian (peat) at West Runton, Norfolk.
5. *a, b.* Posterior and dorsal view of two apposed valves from the Pleistocene at Grays, Essex.
6. *a, b.* —— of a pair of valves from the Cromerian at West Runton, Norfolk.
7. Umbonal view of a right valve from the same formation and locality, greatly enlarged to show the characteristic sculpturing.
8. *a-c.* External aspect of three right valves from the same formation and locality.

\*.\* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.





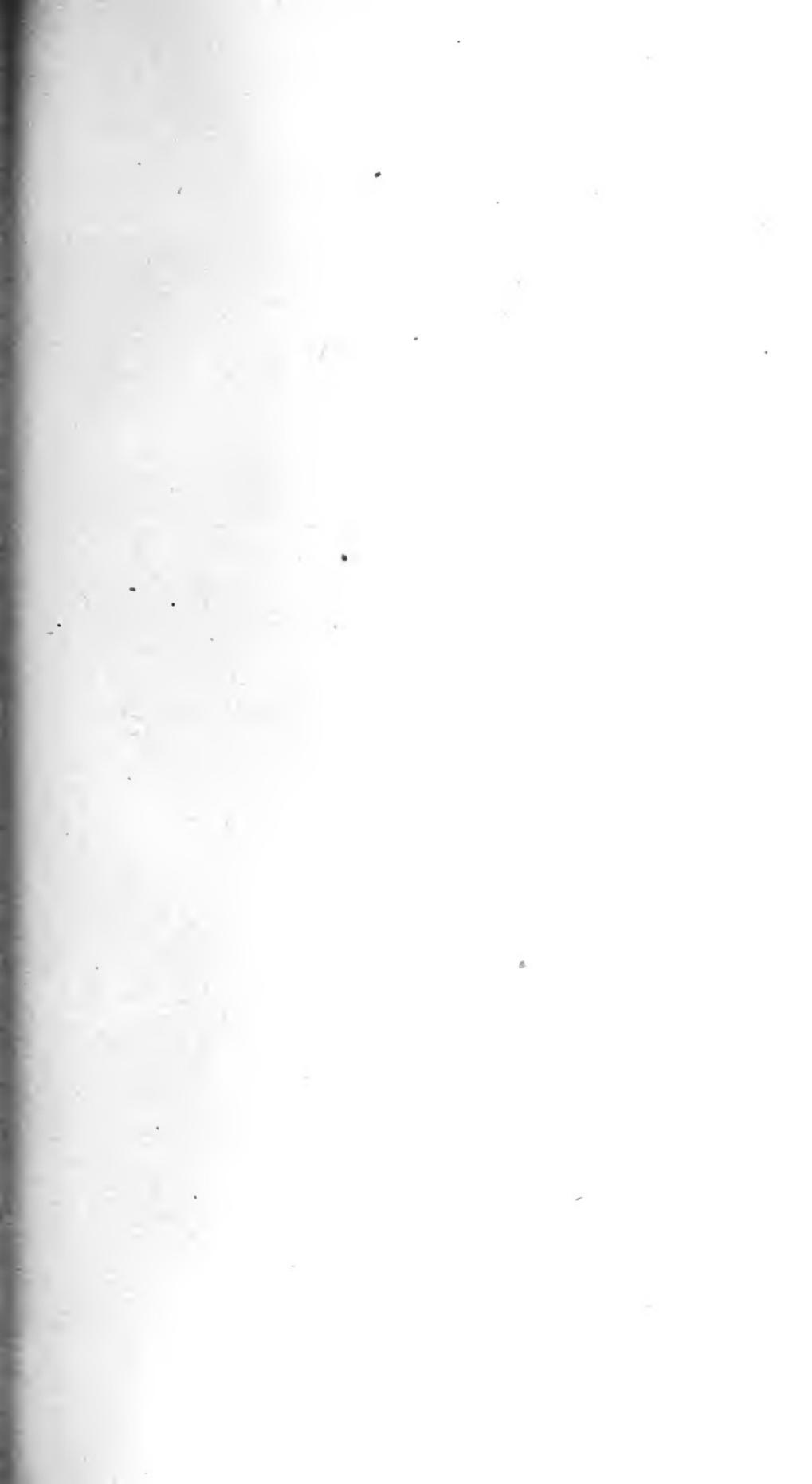
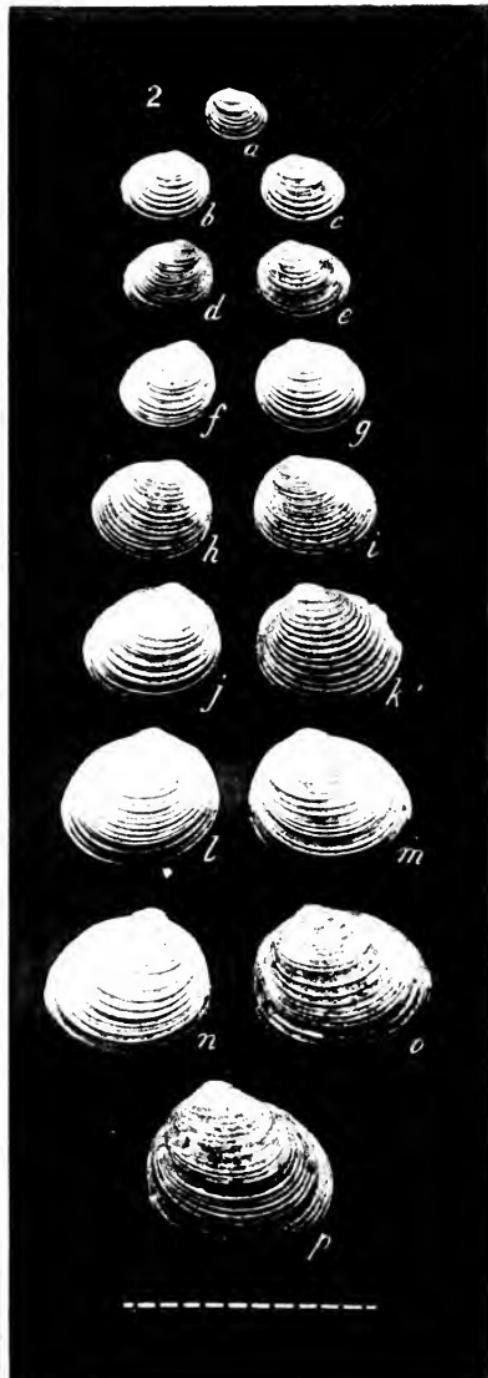
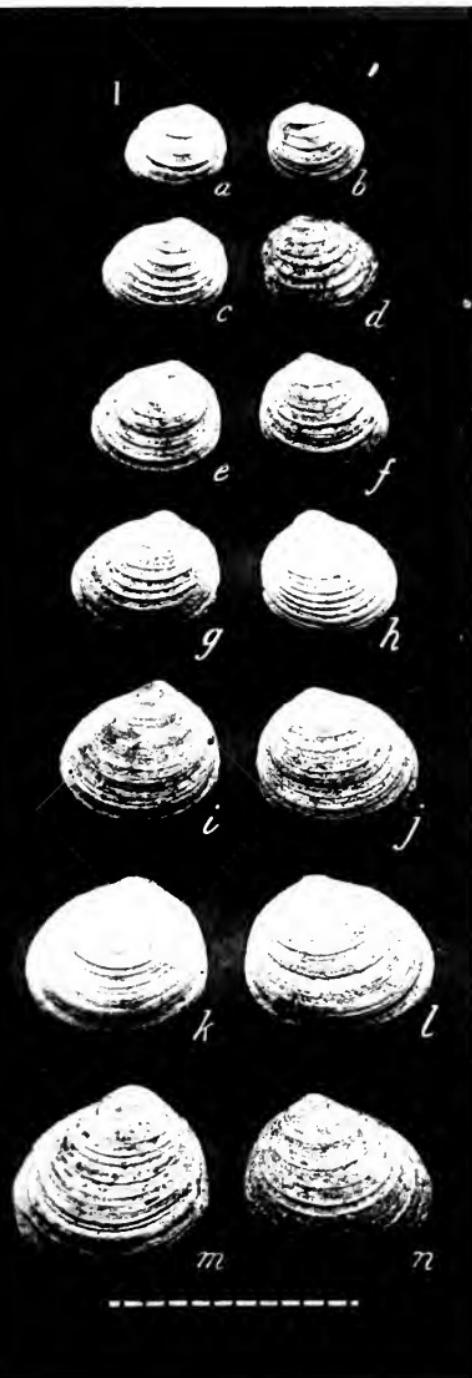


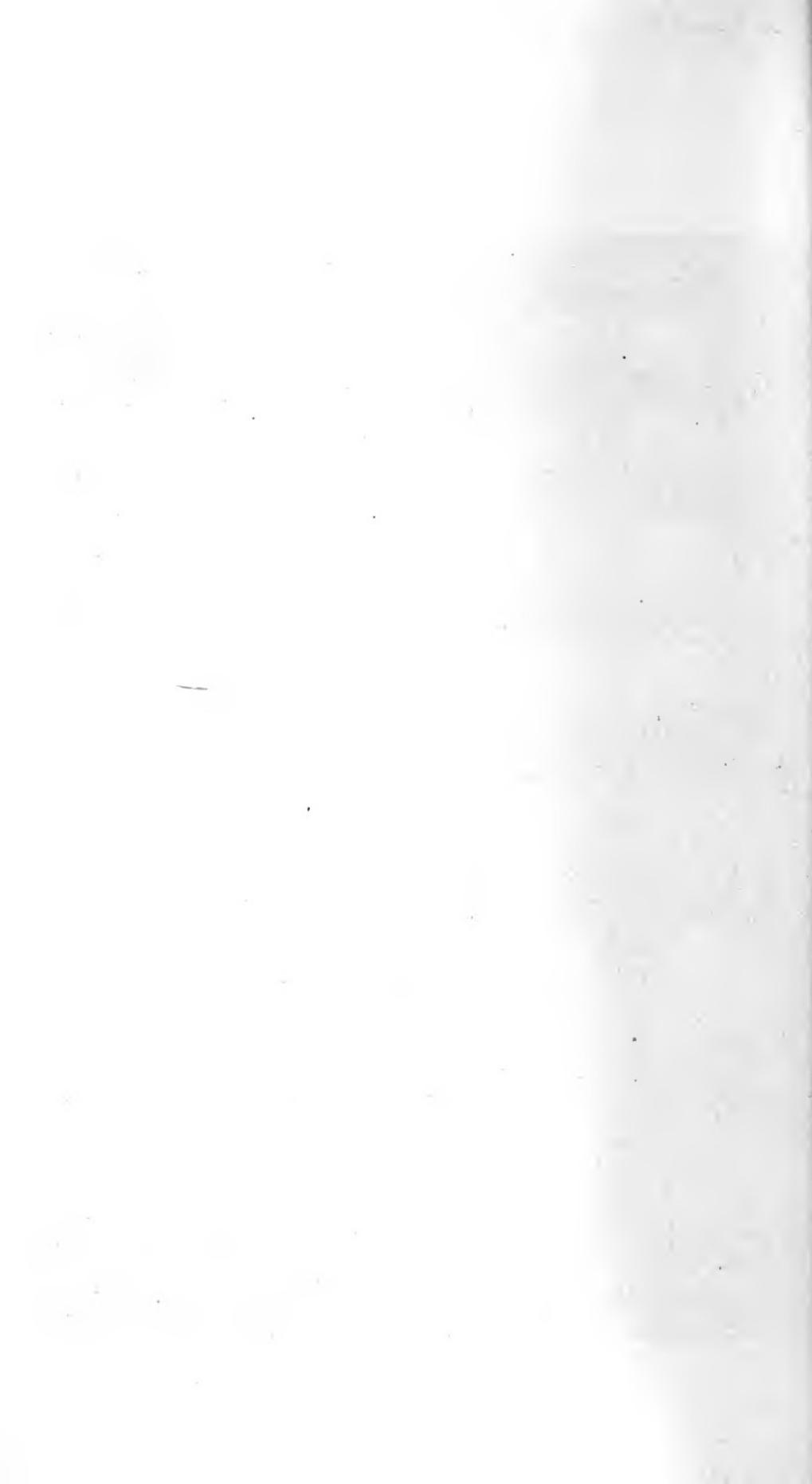
PLATE XI.

*PISIDIUM ASTARTOIDES*, Sandberger.

1. *a-n.* External aspect of a series of valves showing variation in the outline and sculpture, from the Cromerian (gravel) at West Runton, Norfolk.
2. *a-p.* —— from the Pleistocene at Swanscombe, Kent.

\* \* \* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.





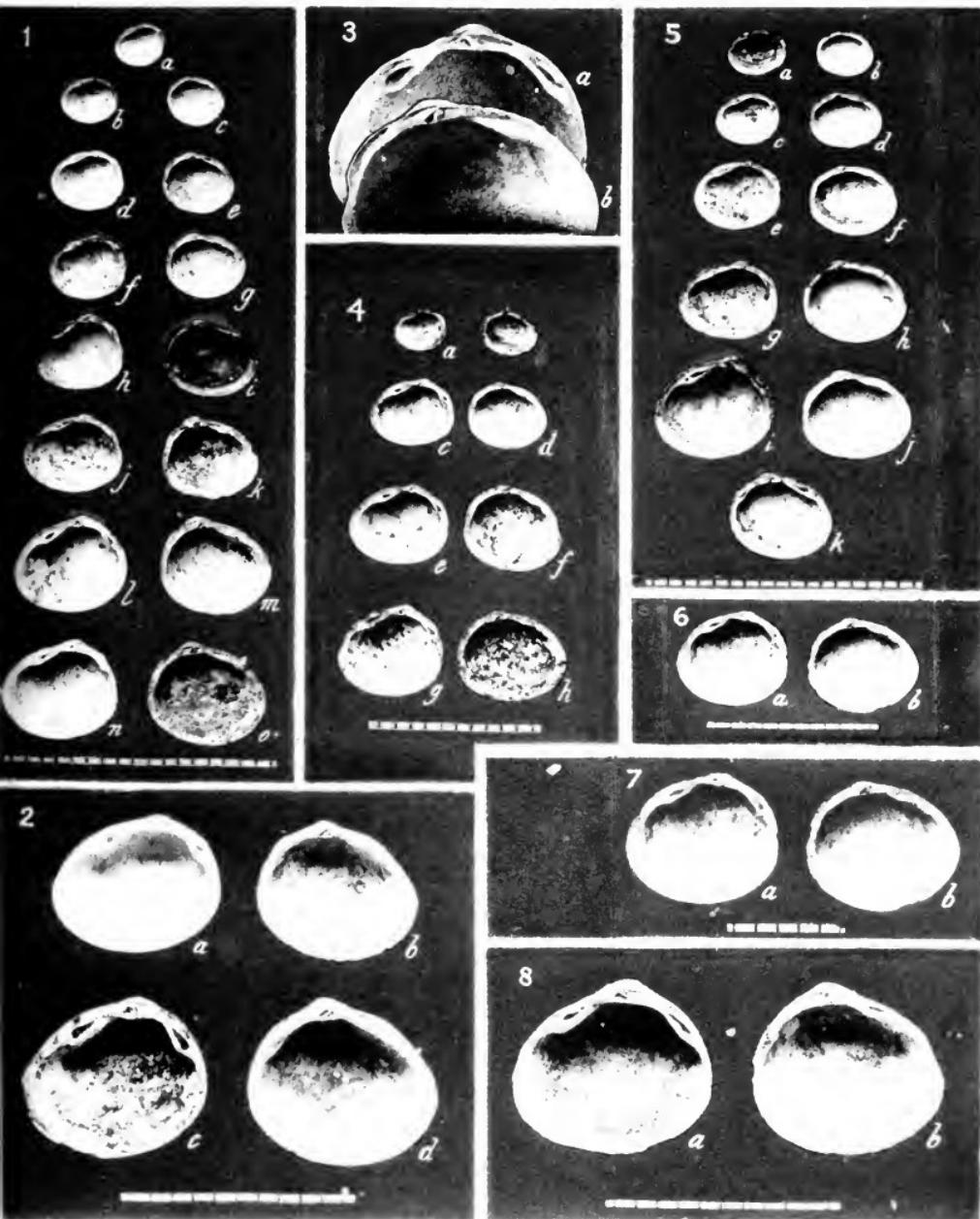


## PLATE XII.

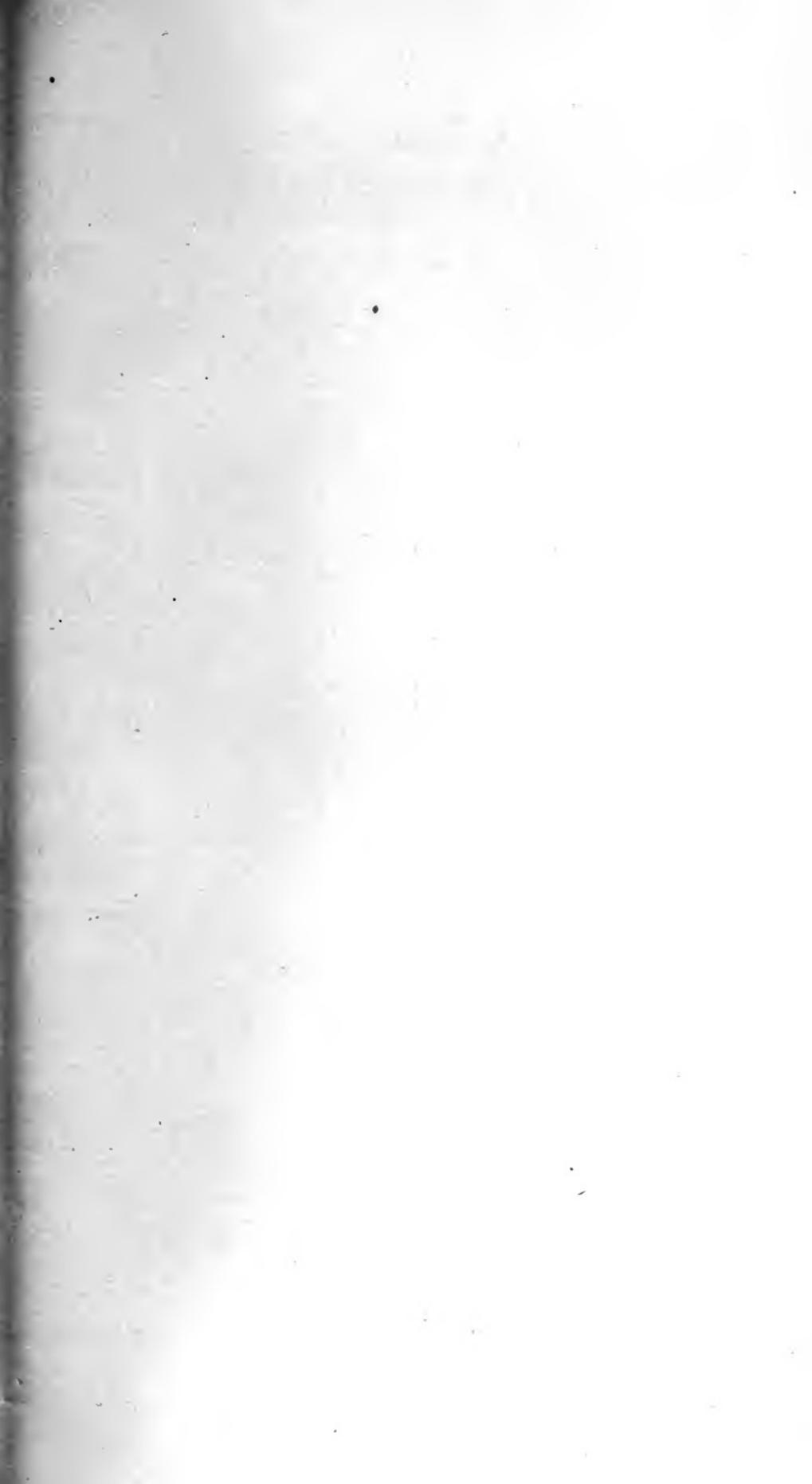
### *PISIDIUM ASTARTOIDES*, Sandberger.

1. *a-o.* Internal aspect of a series of valves of all ages showing variation in form of outline and strength of hinge, from the Pleistocene at Swanscombe, Kent.
2. *a-d.* —— of four adult valves from the Pleistocene at Grays, Essex.
3. Diagrammatic enlargement of the Hinge.
4. *a-h.* Internal aspect of a series of valves of different ages showing variation, from the Pleistocene at Crayford-Erith, Kent.
5. *a-k.* —— from the Pleistocene at Clacton, Essex.  
[*5g* is a right valve having the double cardinals proper to the left valve; whilst *a. III.* and *p. III.* are reduced in size. *5k*, on the other hand, is a left valve having the dentition proper to a right valve.]
6. *a, b.* —— two adult valves from the Cromerian at West Runton, Norfolk.
7. *a, b.* —— the same two more highly magnified.
8. *a, b.* —— two valves from the Cromerian (gravel) of the same place.

\* \* \* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.





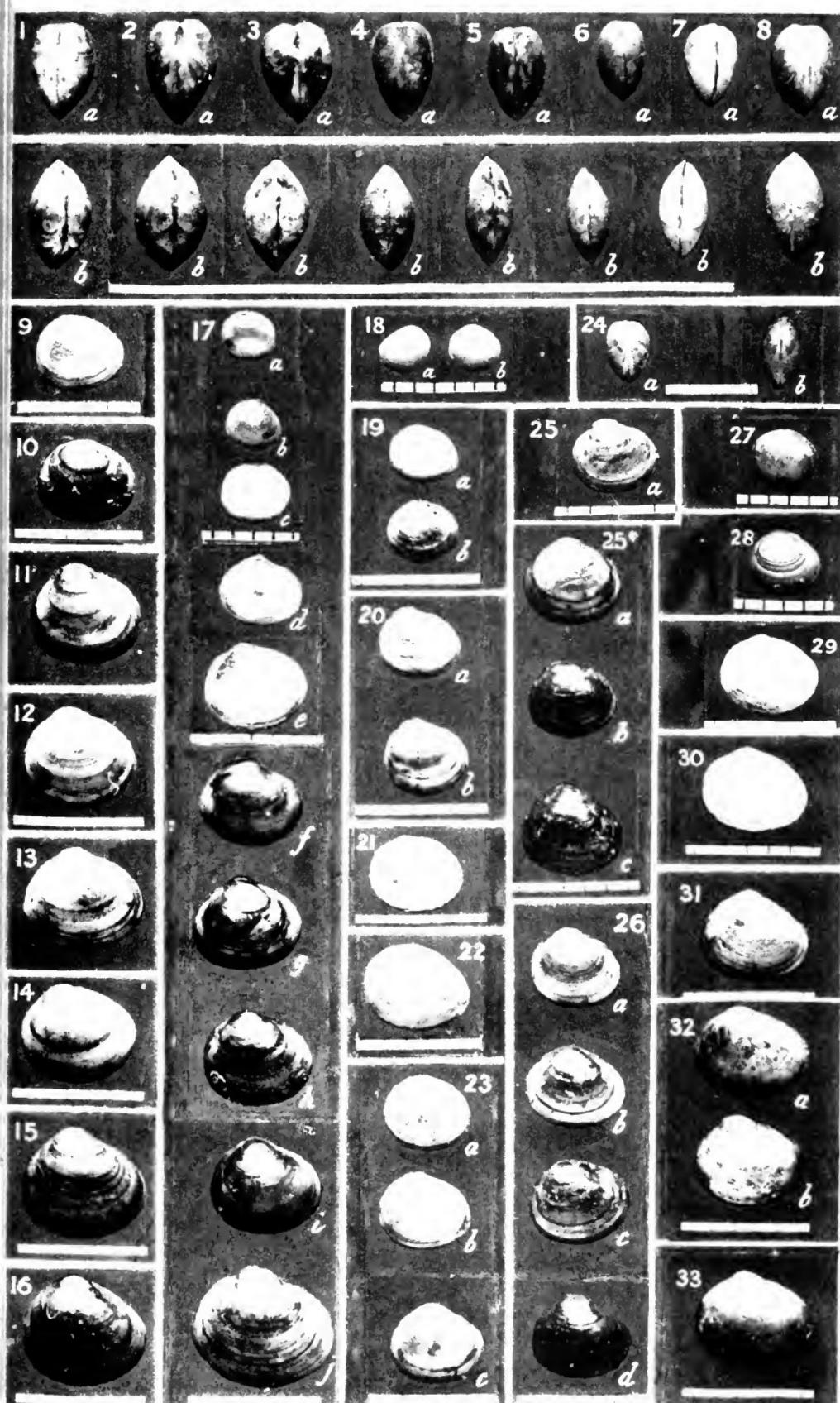


### PLATE XIII.

#### PISIDIUM CASERTANUM (Poli).

1. a, b. Posterior and dorsal view of a pair from Fitton Hall, Oldham, Lancashire. ("*Pisidium pusillum*, var. *grandis*": T. Rogers coll.)
2. a, b. —— of a pair from Swinton, Lancashire. ("*Pisidium pusillum*, variety. J. G. Jeff.": T. Rogers coll.)
3. a, b. —— of a pair from Lagan Canal (2nd lock), Cos. Down and Antrim.
4. a, b. —— of a pair from Scarborough, Yorkshire.
5. a, b. —— of a pair from Bassenthwaite, Cumberland.
6. a, b. —— of a pair from Lancaster.
7. a, b. —— of a pair from the Sebeto, Naples.
8. a, b. —— of a pair from Wniana, Roumania. ("*P. fossarinum*, Clessini & C. Pfr., var. *rosea*, Scholtz" from O. Boettger.)
9. External right aspect of a pair from Manchester. ("*P. fontinale*, var. *cineratum* [sic], marked "J. G. Jeff.": T. Rogers coll.)
10. —— of a pair from Swinton, Lancashire. ("*P. fontinale*, var. *cineratum* [sic], marked "J. G. Jeff.": T. Rogers coll.)
11. —— of a pair from Scarborough, Yorkshire.
12. —— of a pair from Swinton, Lancashire. ("*P. pusillum*, large variety. J. G. Jeff.": T. Rogers coll.)
13. —— of a pair from Fitton Hall, Oldham, Lancashire. ("*P. pusillum*, var. *grandis*": T. Rogers coll.)
14. —— of a pair from Bath, Somerset. ("*P. fontinale*, var. *pulcherrimum*, named by Mr. Jenyns": T. Rogers coll.)
15. —— of a pair from Addington, Surrey.
16. —— of a pair from Gateshead, Durham. ("*P. cinereum*": T. Rogers coll.)
17. a-j. —— of a series of the "lake form" from Bassenthwaite, Cumberland.
18. External left and right aspect of a pair from the type locality at Caserta, Italy.
19. a, b. External right aspect of two pairs from Hendon, Middlesex.
20. a, b. —— of two pairs from North Wootton, Norfolk.
21. —— of a pair from Shirwell, Devonshire.
22. —— of a pair from Lancaster.
23. —— of three pairs from Lochmaben, Dumfriesshire.
24. a, b. Posterior and dorsal view of a pair from Vestre Aker, Christiania.
25. —— of a pair from Coolkeeragh, Co. Londonderry.
- 25\*. a-c. —— of three pairs from the Lagan Canal, Cos. Down and Antrim.
26. a-d. —— of four pairs from Annadale, Co. Down.
27. —— of a pair from Sicily. ("*Galileja tenebrosa*, O. G. Costa & R. Bellini.)
28. —— of a pair from Vestre Aker, Christiania.
29. —— of a pair from Mt. Majella, Italy. ("*P. casertanum*, var. *cularis*, Norm.": R. Bellini.)
30. —— of a pair from the Sebeto, Naples.
31. —— of a pair from Wniana, Roumania. ("*P. fossarinum*, Clessini & C. Pfr., var. *australe*, Phill.": R. Bellini.)
32. a, b. —— of two pairs from Naples. ("*P. australis*, Phill.": R. Bellini.)
33. —— of a right valve from Trancailla, Italy.

\*\* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.





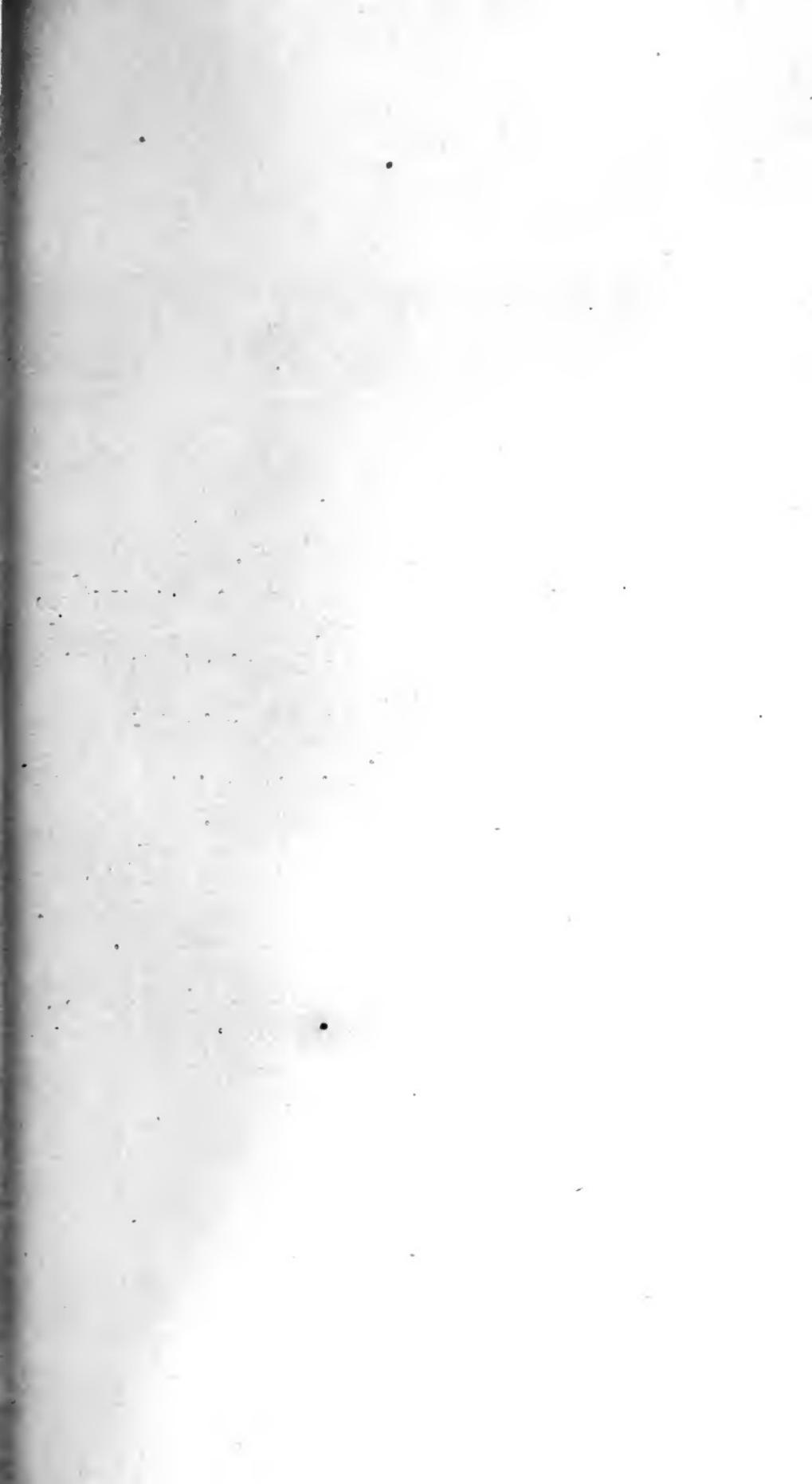
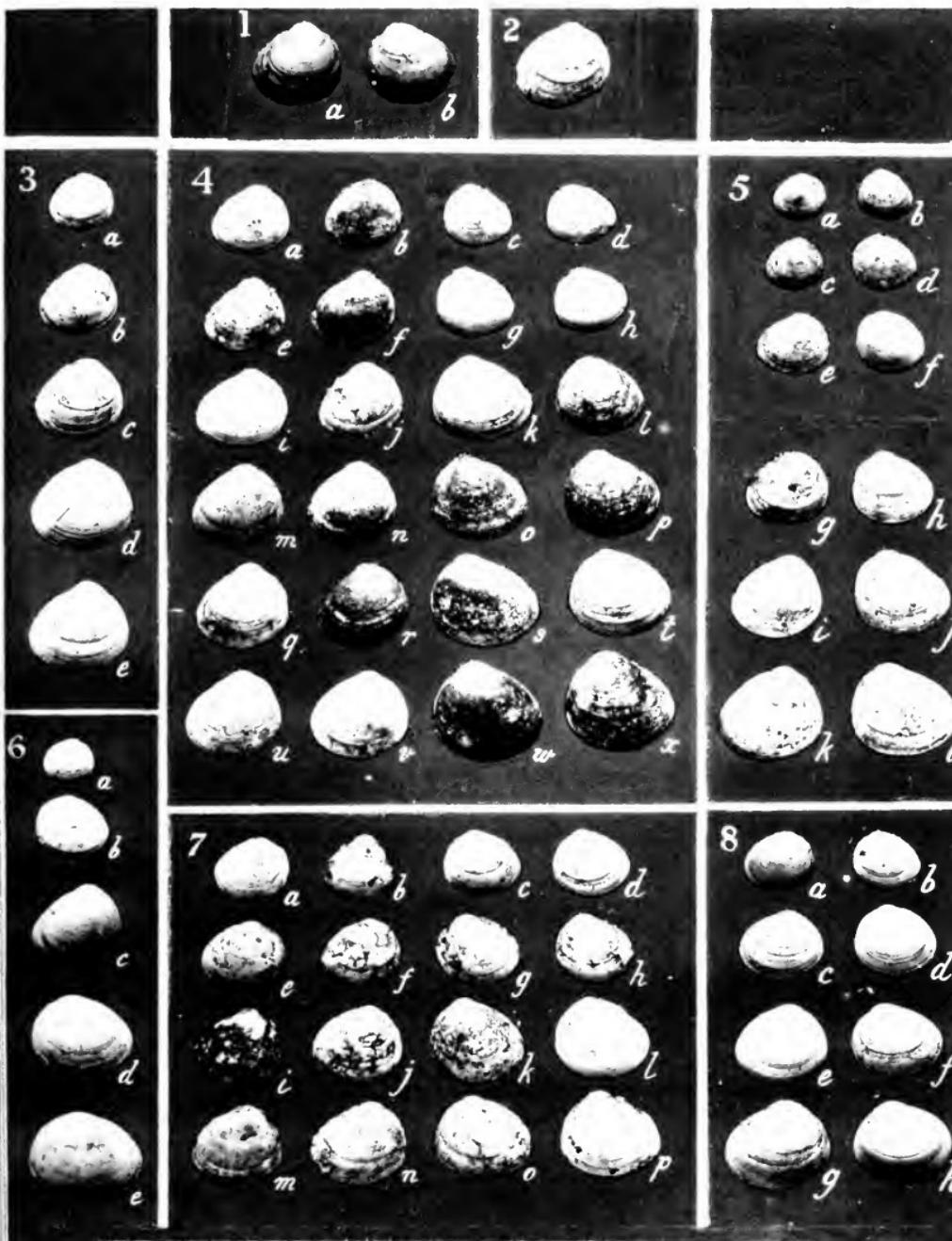


PLATE XIV.

*PISIDIUM CASERTANUM* (Poli).

1. *a, b.* External aspect of two opposite valves from the Holocene at Gayfield, Edinburgh.
2. —— of left valve from the Cromerian (peat) at West Runton, Norfolk.
3. *a-e.* —— of a series of left valves from the Holocene at Dagenham, Essex.
4. *a-x.* —— of a series of valves showing variation, from the Pleistocene at Swanscombe, Kent.
5. *a-l.* —— —— from the Pleistocene at Grays, Essex.
6. *a-e.* —— —— from the Holocene at Newbury, Berkshire.
7. *a-p.* —— —— from the Pleistocene at Crayford-Erith, Kent.
8. *a-h.* —— —— from the Pleistocene at Clacton, Essex.

\* \* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.





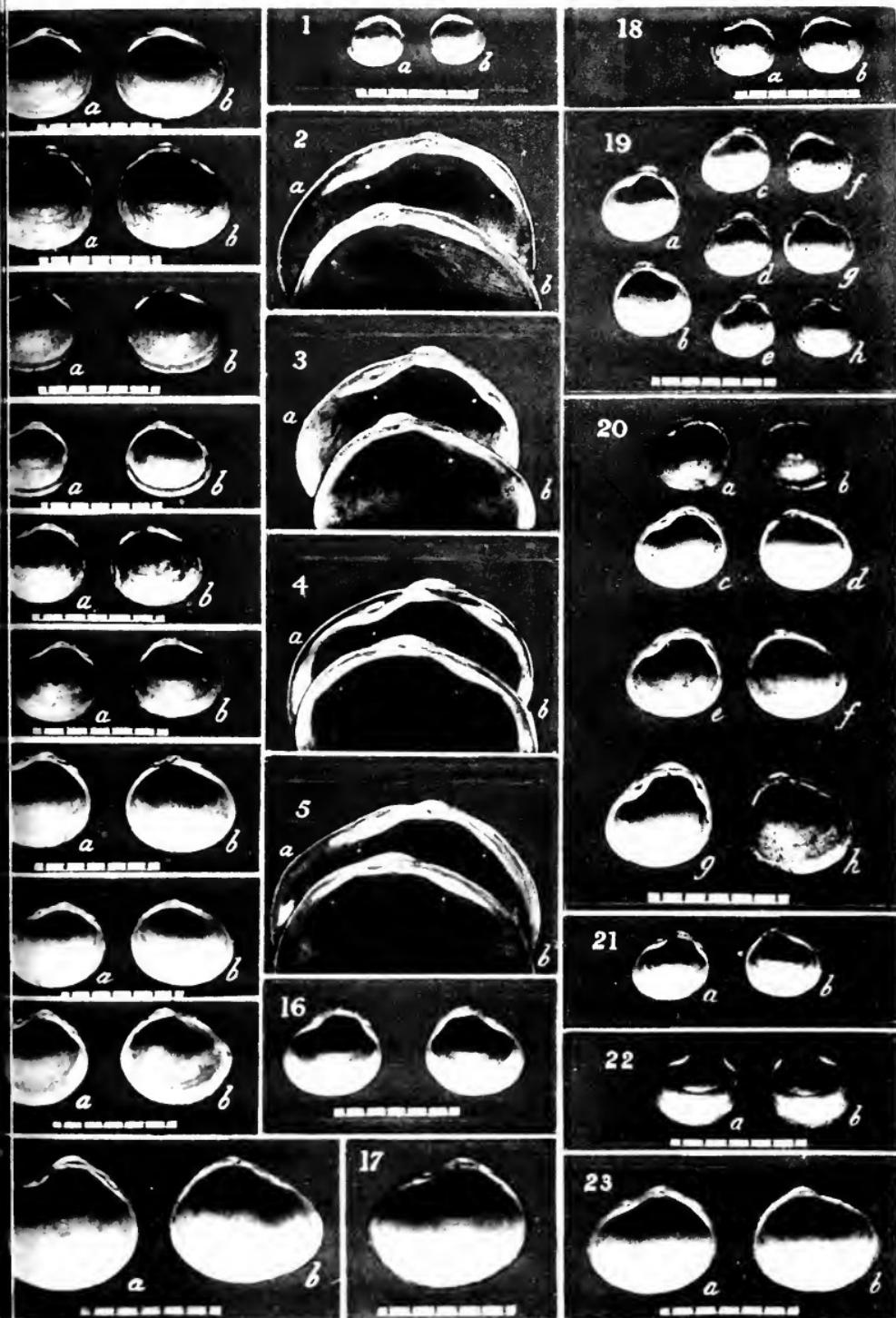


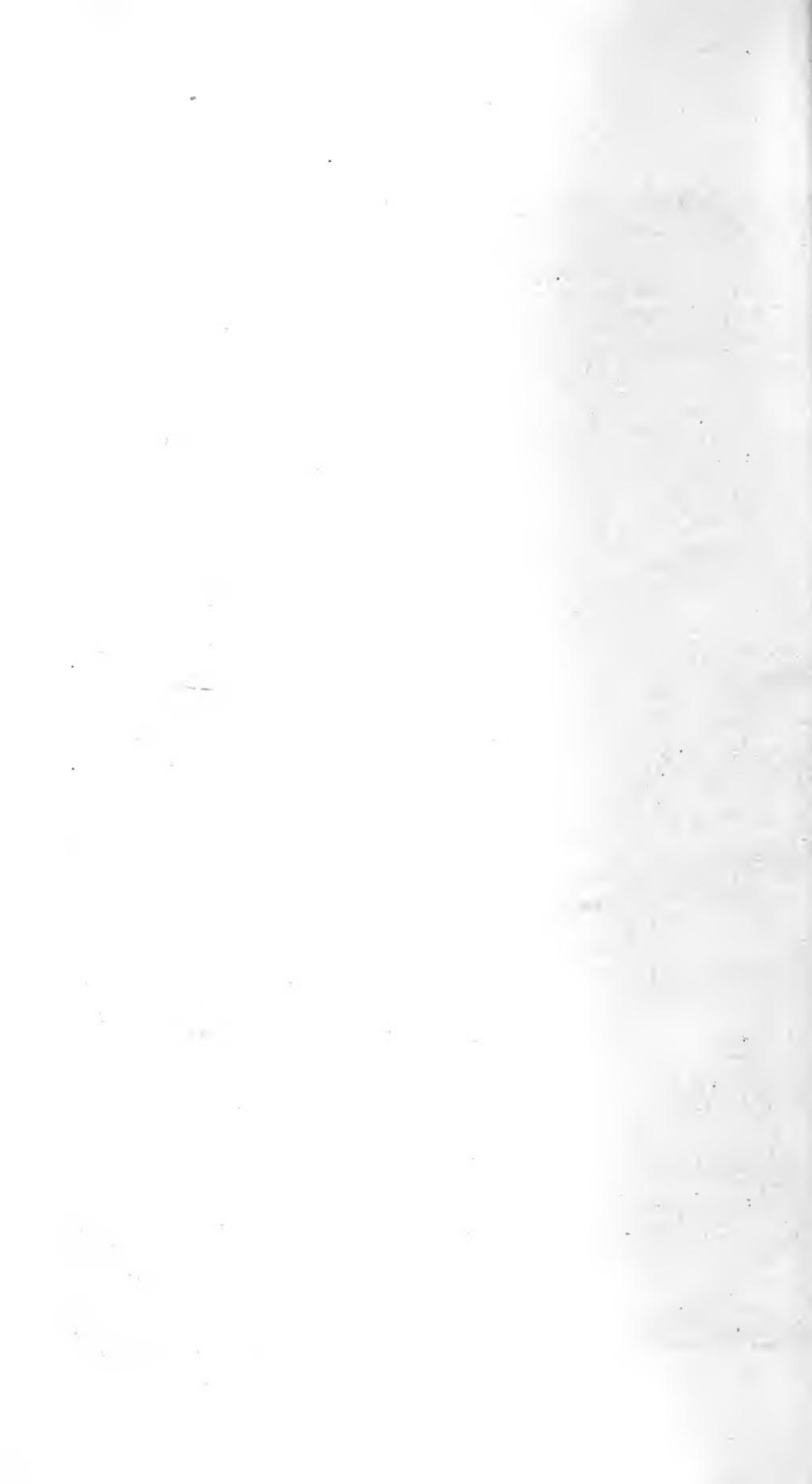
## PLATE XV.

## PISIDIUM CASERTANUM (Poli).

1. *a, b.* External aspect of a pair from the type locality, Caserta.
2. *a, b.* Enlargement of the Hinge of the above.
3. *a, b.* Diagrammatic enlargement of the Hinge of a typical specimen.
4. *a, b.* Enlargement of the Hinge of *P. fossarinum*, Clessin.
5. *a, b.* Diagrammatic enlargement of the Hinge of the lake, or still-water form.
6. *a, b.* Internal aspect of a pair of valves from Fitton Hall, Oldham, Lancashire. ("*P. pusillum*, var. *grandis*": T. Rogers coll.)
7. *a, b.* —— of a pair from Gateshead, Durham. ("*P. cinereum*": T. Rogers coll.)
8. *a, b.* —— of a pair from Scarborough, Yorkshire.
9. *a, b.* —— of a pair from Annadale, Co. Down.
10. *a, b.* —— of a pair from Swinton, Lancashire. ("*P. fontinale*, var. *cinerereum* [sic]," marked "J. G. Jeff.": T. Rogers coll.)
11. *a, b.* —— of a pair from Manchester. ("*P. fontinale*, var. *rosea*, Scholtz" from O. Boettger.)
12. *a, b.* —— of a pair from Swinton, Lancashire. ("*P. pusillum*, large variety, J. G. Jeff.": T. Rogers coll.)
13. *a, b.* —— of a pair from Naples. ("*P. australe*, Phill.": R. Bellini.)
14. *a, b.* —— of a pair from Bath, Somersetshire. ("*P. fontinale*, var. *pulchella*, named by Mr. Jenyns": T. Rogers coll.)
15. *a, b.* —— of a pair from Addington, Surrey.
16. *a, b.* —— of a pair from Saunton, Mortehoe, Devon.
17. —— of a right valve from Trancailla, Italy.
18. *a, b.* —— of a pair from Sicily. ("*Galileja tenebrosa*, O. G. Costa": R. Bellini.)
19. *a-h.* —— of a series of valves from Giesegaard, near Borup, Sealand.
20. *a-h.* —— —— from Lyngby-Bagsvör Sö, Sealand.
21. *a, b.* —— of a pair of valves from North Wootton, Norfolk.
22. *a, b.* —— of a pair from Tudor Hill, Sutton Coldfield, Warwickshire.
23. *a, b.* —— of a pair from Trancailla, Italy.

\* \* \* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.





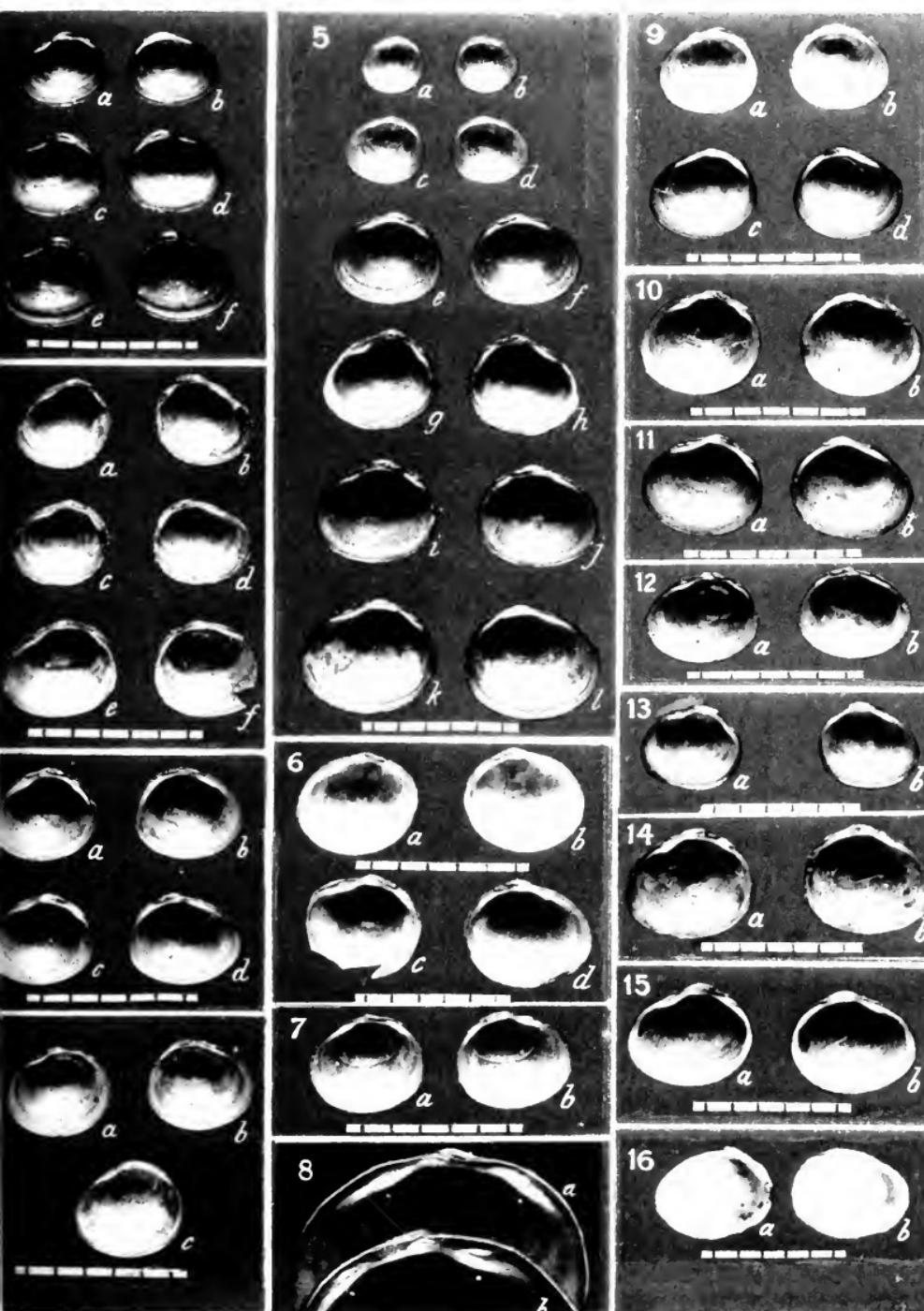


## PLATE XVI.

### PISIDIUM CASERTANUM (Poli).

1. *a-f.* Internal aspect of a series of three pairs from Hendon, London.
2. *a-f.* —— —— from Damage Pond, Mortehoe, Devon.
3. *a-d.* —— of two pairs from Borough Stream, Mortehoe, Devon.
4. *a-c.* —— of a pair and an odd valve from Lochmaben, Dumfriesshire.
5. *a-l.* —— of a series of pairs of the lake form, from Bassenthwaite, Cumberland.
6. *a-c.* —— of two pairs from Shirwell, Devon.
7. *a, b.* —— of an abnormal pair from Newtownards, Co. Down.
8. *a, b.* —— of the Hinge of the same enlarged.  
[The right valve shows a double, instead of a single, cardinal; whilst *a. III.* is suppressed and *p. III.* reduced. In the left valve the lateral teeth are doubled as in a normal right valve.]
9. *a-d.* —— of two pairs from Vestre Aker, Christiania. ("*P. globulare*, Clessin.")
10. *a, b.* —— of a pair from Mt. Majella, Italy. ("*P. casertanum*, var. *lenticularis*, Norm.": R. Bellini.)
11. *a, b.* —— of a pair from Lancaster.
12. *a, b.* —— of a pair from Bennett's Mouth, Mortehoe, Devon.
13. *a, b.* —— of a pair from Coolkeeragh, Co. Londonderry.
14. *a, b.* —— of a pair from Lagan Canal (2nd lock), Cos. Down and Antrim.
15. *a, b.* —— of a pair from Wniana, Roumania. ("*P. fossarium*, Clessin.")
16. *a, b.* —— of a pair from the Sebeto, Naples.

\* \* \* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.







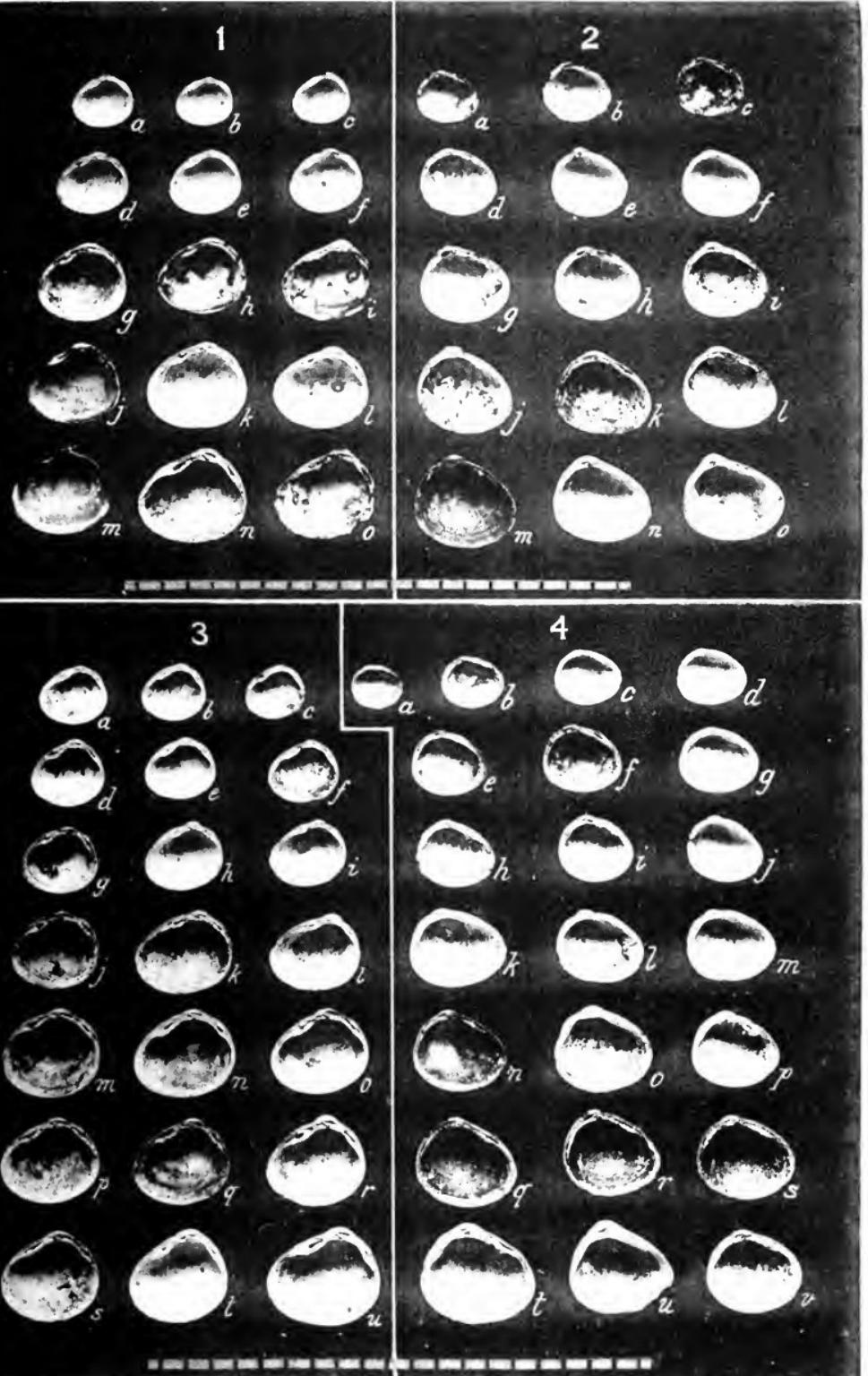
## PLATE XVII.

### *PISIDIUM CASERTANUM* (Poli).

1. *a-o.*} Internal aspect of a series of valves showing variation,  
2. *a-o.*} from the Pleistocene at Crayford-Erith, Kent.  
3. *a-u.*} —— from the Pleistocene at Swanscombe, Kent.  
4. *a-v.*} ——

[3 *q* & *s* and 4 *p* are abnormal, partly reproducing  
the characters of the opposite valve. The two former  
having each a single anterior lateral tooth instead of  
two; whilst the last has a double instead of a single  
anterior lateral.]

\*.\* The scale in millimetres under each figure, or series of figures,  
shows the amount of magnification.





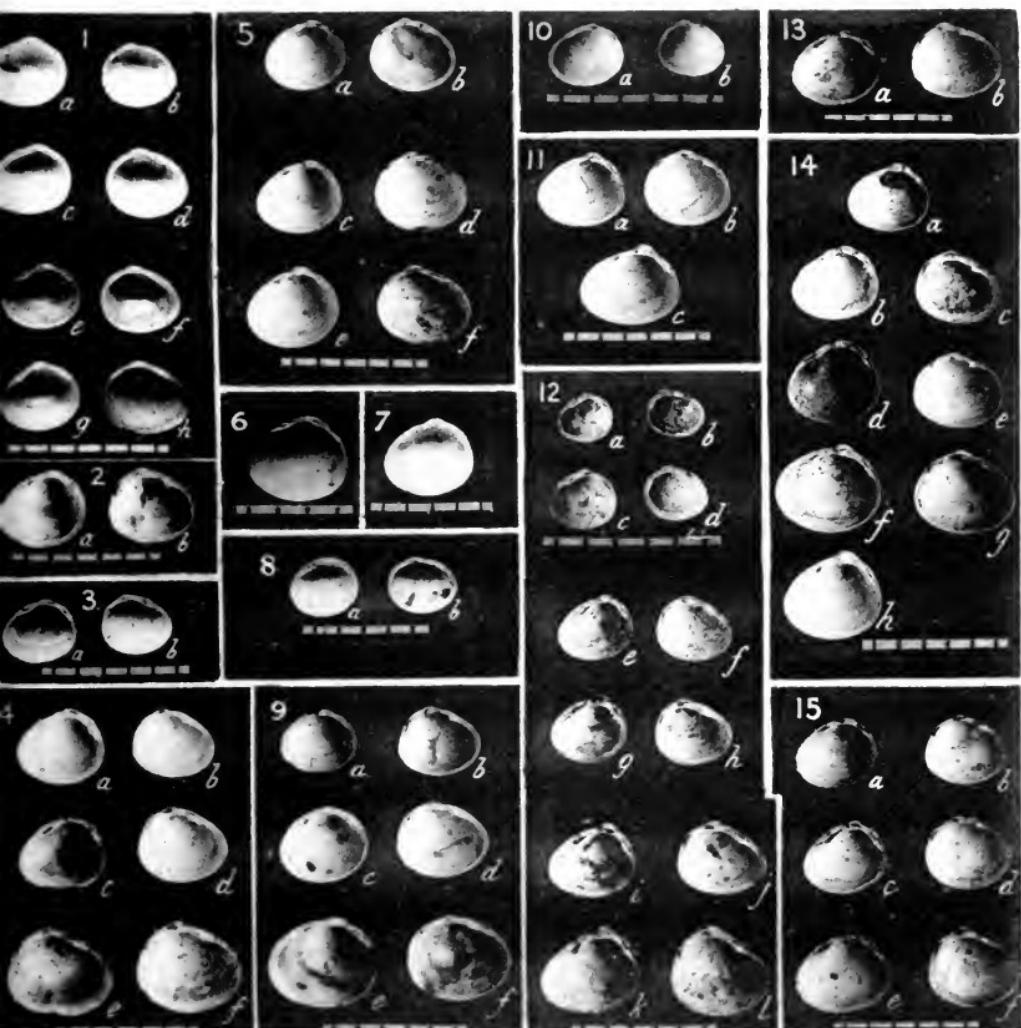


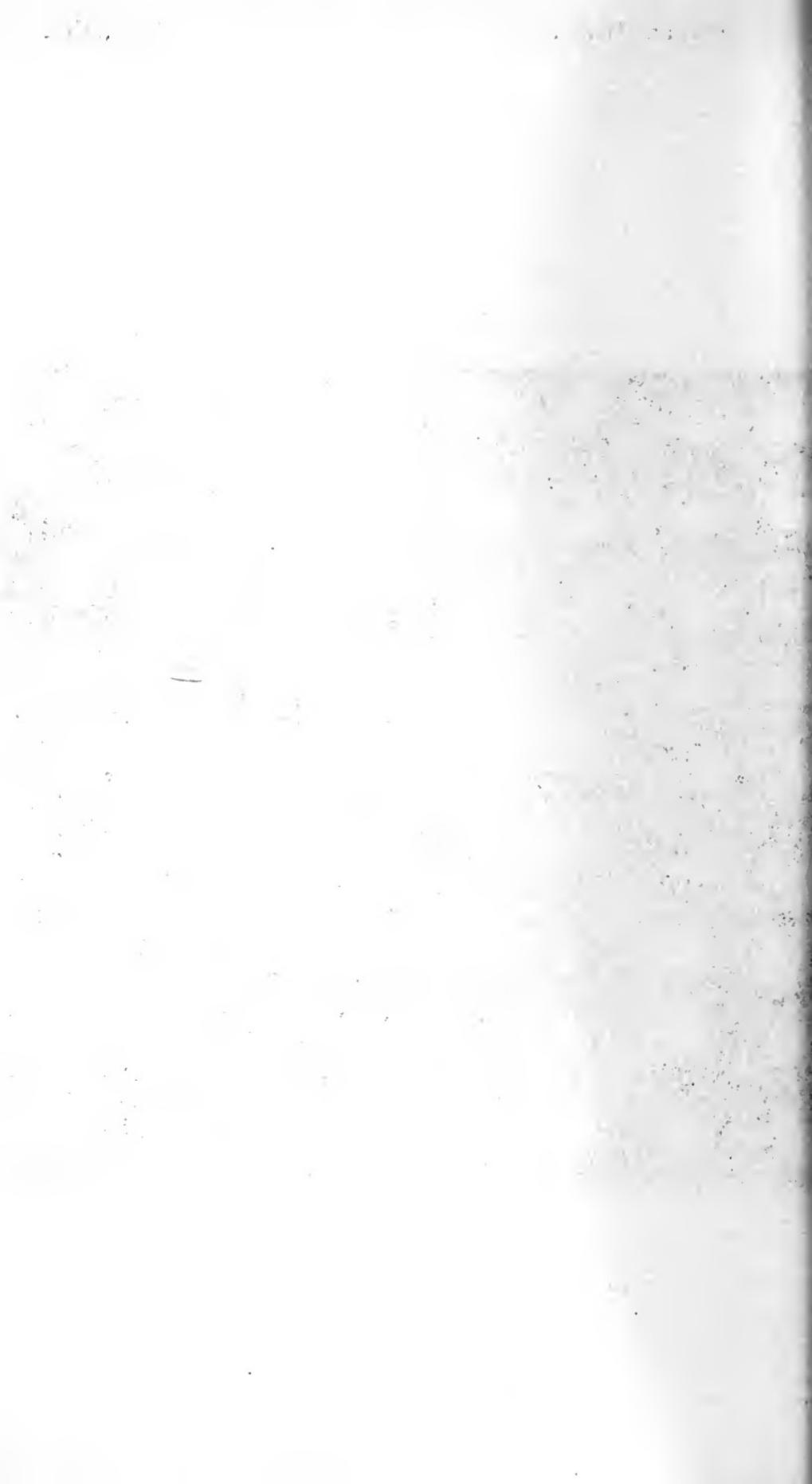
## PLATE XVIII.

### *PISIDIUM CASERTANUM* (Poli).

1. *a-h.* Internal aspect of a series of valves from the rejecta-menta of the Thames, Chertsey Mead, Surrey.
2. *a, b.* —— of two valves from the Holocene in Berkshire, near Staines.
3. *a, b.* } —— of a series of valves from the Holocene at Dagenham,
4. *a-f.* } Essex.
5. *a-f.* —— of a series of valves from the Holocene at Gayfield, Edinburgh.
6. —— of abnormal right valve from the Holocene at Elie, Fifehire, in which one of the posterior lateral teeth is suppressed.
7. —— —— from the Pleistocene of Swanscombe, Kent, in which the lateral teeth are single instead of double.
8. *a, b.* } —— of a series of valves from the Holocene at Newbury,
9. *a-f.* } Berks.
10. *a, b.* } —— —— from the Holocene at Westbury-on-Severn,
11. *a-c.* } Gloucestershire.
12. *a-l.* —— —— from the Pleistocene at Grays, Essex.
13. *a, b.* —— of two valves from the Pleistocene at West Wittering, Sussex.
14. *a-h.* —— of a series of valves from the Pleistocene at Clacton, Essex.
15. *a-f.* —— —— from the Cromerian (peat) at West Runton, Norfolk.

\* \* \* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.





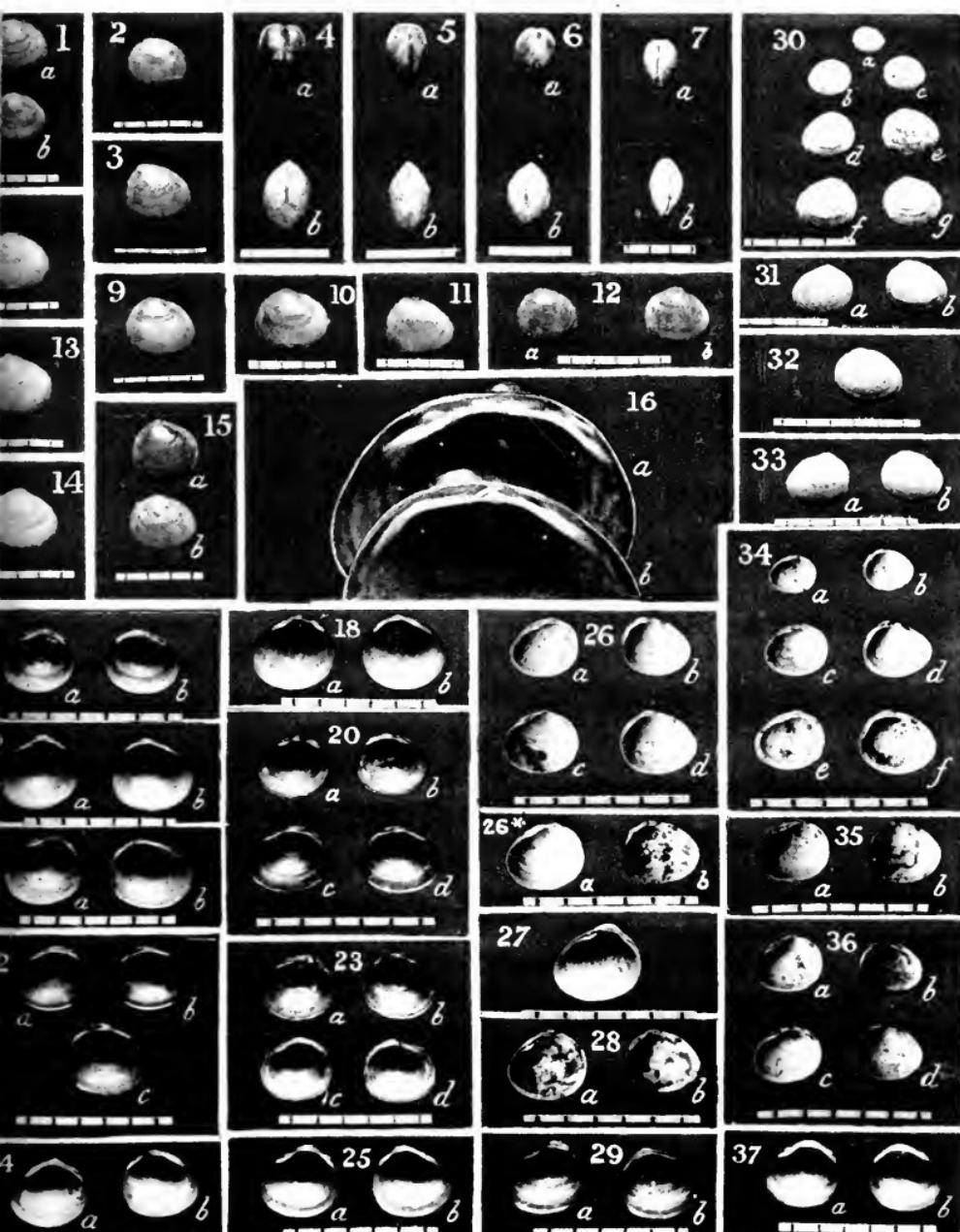


## PLATE XIX.

## PISIDIUM NITIDUM, Jenyns.

1. a, b. External right aspect of two pairs from Swinton, Lancashire. (T. Rogers coll.)
2. —— of a pair from Truro, Cornwall. (O. Boettger.)
3. —— of a pair from Sutton Coldfield Park, Warwickshire.
4. a, b. Posterior and dorsal view of a pair from Tenby, Pembrokeshire.
5. a, b. —— of a pair from Lough Fern, Co. Donegal.
6. a, b. —— of a pair from Swinton, Lancashire. (T. Rogers coll.)
7. a, b. —— of a pair from the Holocene of the Lea Valley, London.
8. External right aspect of a pair from Hoe Moor, Hampshire. ("Var. *lateralis*.")
9. —— of a pair from Louth, Lincolnshire.
10. —— of a pair from Church Close, Mortehoe, Devon.
11. —— of a pair from Lough Fern, Co. Donegal.
12. a, b. —— of two pairs from Deutschbrod, Bohemia.
13. —— of a pair from Tenby, Pembrokeshire.
14. —— of a pair from Gt. Gaddesden, Hertfordshire.
15. a, b. —— of two pairs from Lochmaben, Dumfriesshire.
16. Diagrammatic enlargement of the Hinge.
17. a, b. Internal aspect of a pair from Swinton, Lancashire. (T. Rogers coll.)
18. a, b. —— of a pair from Hoe Moor, Hants. ("Var. *lateralis*.")
19. a, b. —— of a pair from Tenby, Pembrokeshire.
20. a-d. —— of two pairs from Lochmaben, Dumfriesshire.
21. a, b. —— of a pair from Lough Fern, Co. Donegal.
22. a-c. —— of a pair and a left valve from Church Close, Mortehoe, Devon.
23. a-d. —— of two pairs from Deutschbrod, Bohemia.
24. a, b. —— of a pair from Truro, Cornwall. (O. Boettger.)
25. a, b. —— of a pair from Louth, Lincolnshire.
26. a-d. —— of four valves from the Holocene in Surrey, near Staines.
- 26\*. a, b. —— of two valves from the Holocene of the Lea Valley, London.
27. —— of a right valve from the Holocene at Newbury, Berks.
28. a, b. —— of two valves from the Holocene at Clifton Hampden, Oxfordshire.
29. a, b. —— of a pair from Sutton Coldfield Park, Warwickshire.
30. a-g. External aspect of a series of valves showing variation, from the Pleistocene at Swanscombe, Kent.
31. a, b. —— of two valves from the Holocene at Clifton Hampden, Oxfordshire.
32. —— of a right valve from the Holocene at Newbury, Berks.
33. a, b. —— of two valves from the Holocene in Surrey, near Staines.
34. a-f. Internal aspect of a series of valves from the Pleistocene at Swanscombe, Kent.
35. a, b. —— of two valves from the Pleistocene at West Wittering, Sussex.
36. a-d. —— of four valves from the Cromerian (peat) at West Runton, Norfolk.
37. a, b. —— of a pair from Gt. Gaddesden, Hertfordshire.

\*\* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.





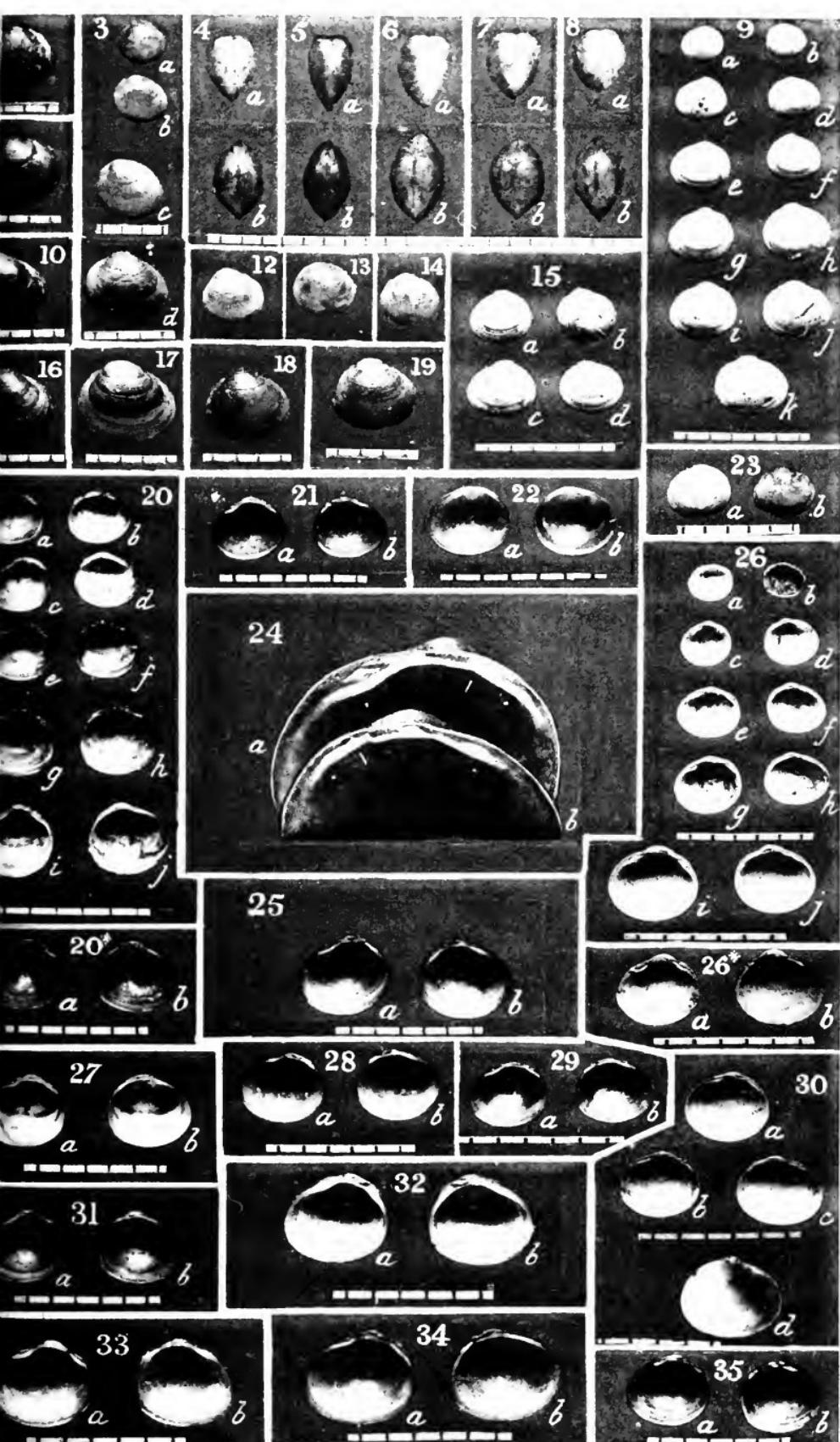


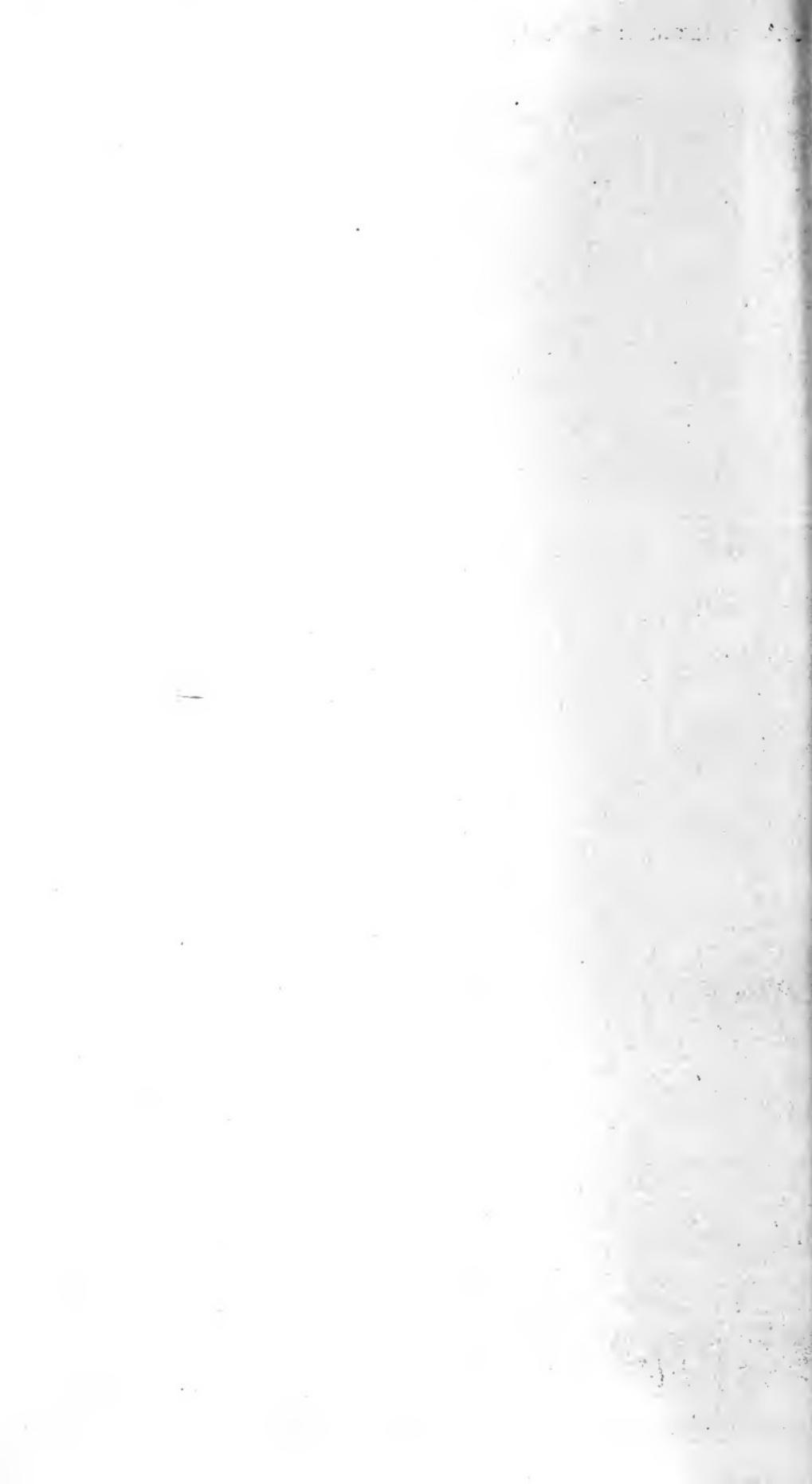
## PLATE XX.

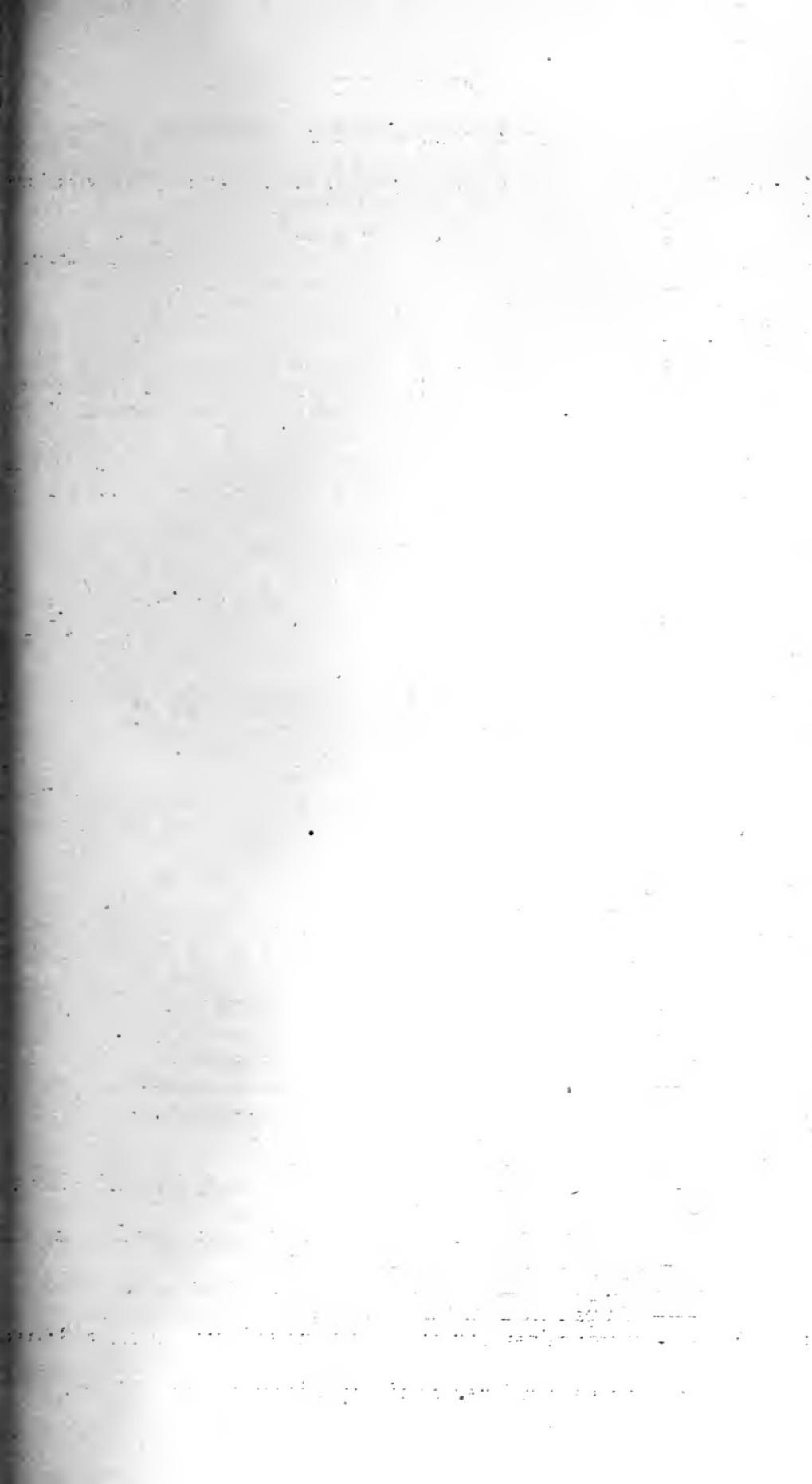
### PISIDIUM PERSONATUM, Malm.

1. External right aspect of a pair from Fitton Hall, Oldham, Lancashire.
2. —— of a pair from Bassenthwaite, Cumberland.
3. *a-d.* —— of four pairs from Lough Fern, Co. Donegal.
4. *a, b.* Posterior and dorsal view of a pair from Barnes Common, Surrey.
5. *a, b.* —— of a pair from Lancaster. ("*P. nitidum* var. *splendens*.")
6. *a, b.* —— of a pair from Fair Head, Co. Antrim.
7. *a, b.* —— of a pair from Colchester (?), Essex.
8. *a, b.* —— of a pair from Ziegenhals, Silesia.
9. *a-k.* External aspect of a series of valves from the Holocene of the Kennet Valley, Berkshire.
10. External right aspect of a pair from Barnes Common, Surrey.
12. —— of a pair from Meigle Moss, Selkirk.
13. —— of a pair from Hoe Moor, Hants.
14. —— of a pair from Borough Pond, Mortehoe, Devon.
15. External aspect of four valves from the Post-tertiary deposit at Clacton, Essex.
16. External right aspect of a pair from Lancaster. ("*P. nitidum* var. *splendens*.")
17. —— of a pair from Fair Head, Co. Antrim.
18. —— of a pair from Colchester (?), Essex.
19. —— of a pair from Ziegenhals, Silesia.
20. *a-j.* Internal aspect of a series of pairs from Bishopthorpe, York.
- 20\*. *a, b.* —— of a pair from Bassenthwaite, Cumberland.
21. *a, b.* —— of a pair from Borough Pond, Mortehoe, Devon.
22. *a, b.* —— of a pair from Meigle Moss, Selkirk.
23. *a, b.* External aspect of two valves from the Pleistocene at Clacton, Essex.
24. Diagrammatic enlargement of the Hinge.
25. *a, b.* Internal aspect of a pair from Lancaster. ("*P. nitidum*, var. *splendens*.)
26. *a-j.* —— of a series of valves showing variation, from the Holocene of the Kennet Valley, Berks.
- 26\*. *a, b.* —— of two valves from the Post-tertiary deposit at Copford, Essex.
27. *a, b.* —— of a pair from Menstrup, Sealand.
28. *a, b.* —— of a pair from Fitton Hall, Oldham, Lancashire.
29. *a, b.* —— of a pair from Hoe Moor, Hants.
30. *a-d.* —— of four valves from the Pleistocene at Clacton, Essex.  
[*a* is abnormal.]
31. *a, b.* —— of a pair from Colchester (?), Essex.
32. *a, b.* —— of a pair from Barnes Common, Surrey.
33. *a, b.* —— of a pair from Lough Fern, Co. Donegal.
34. *a, b.* —— of a pair from Fair Head, Co. Antrim.
35. *a, b.* —— of a pair from Ziegenhals, Silesia.

\*\* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.





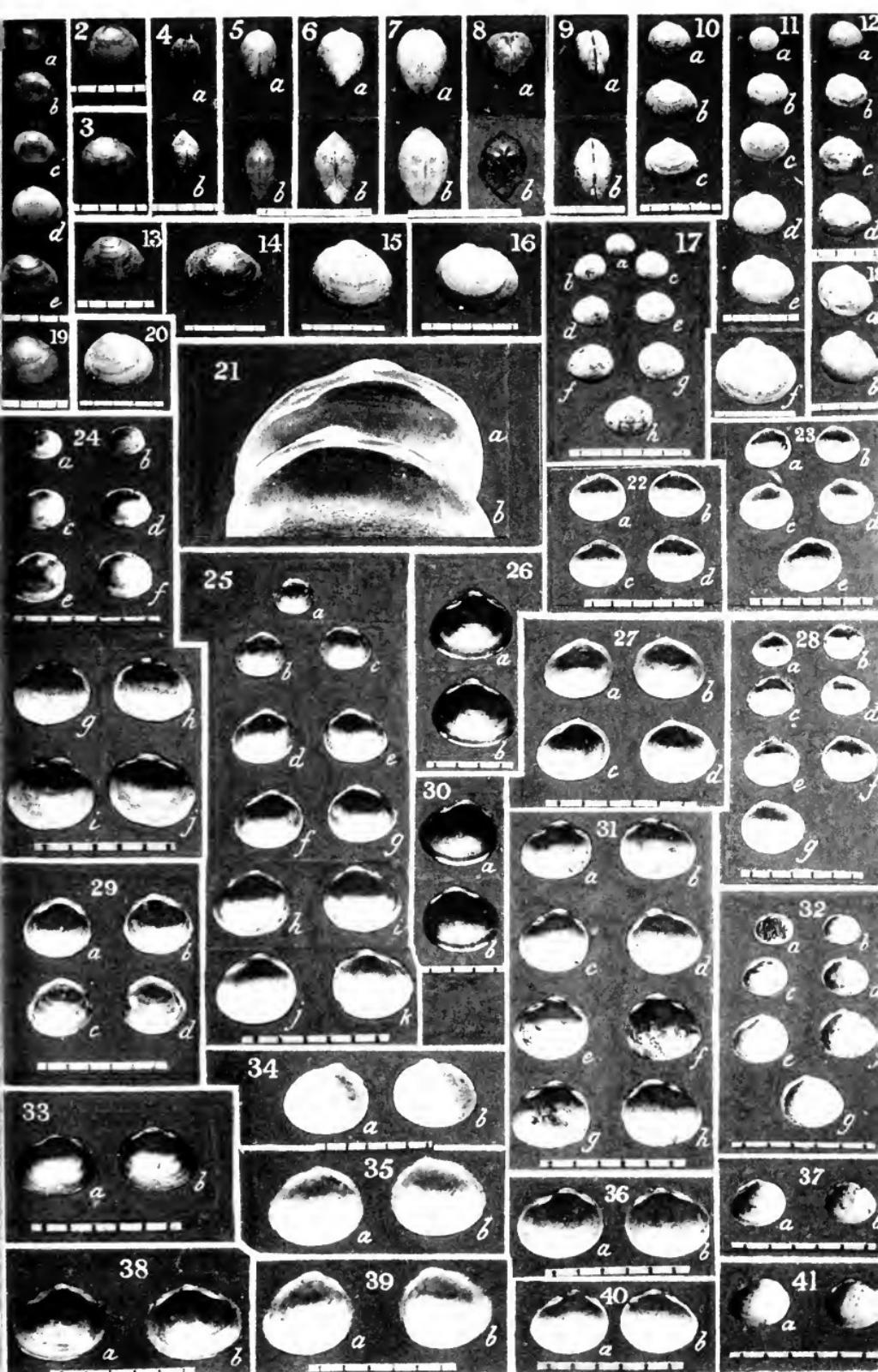


## PLATE XXI.

### *PISIDIUM PUSILLUM*, (Gmelin) Jenyns.

1. *a-e.* External aspect of a series of pairs from Bracebridge, Warwickshire.
2. —— of a pair from the Botanical Gardens, Naples.
3. —— of a pair from Sutton Coldfield Park, Warwickshire.
4. *a, b.* Posterior and dorsal view of a pair from Bracebridge, Warwickshire.
5. *a, b.* —— of a pair from Kilcorrig, Lisburn, Co. Antrim.
6. *a, b.* —— of a pair from Woodburn Dam, Co. Antrim.
7. *a, b.* —— of a pair from Walworth Wood, Co. Londonderry.
8. *a, b.* —— of a pair from Comber, Co. Down.
9. *a, b.* —— of a pair from the Holocene at Magheragera, Co. Fermanagh.
10. *a-c.* External aspect of three right valves from the Holocene at Westbury-on-Severn, Gloucestershire.
11. *a-f.* —— right aspect of a series of six pairs from Woodburn Dam, Co. Antrim.
12. *a-d.* —— of a series of four pairs from the Holocene of the Lea Valley, London.
13. —— of a pair from Tenby, Pembrokeshire.
14. —— of a pair from Comber, Co. Down.
15. —— of a pair from Walworth Wood, Co. Londonderry.
16. —— of a pair from the River Po, Italy.
17. *a-h.* External aspect of a series of valves showing variation, from the Pleistocene at Swanscombe, Kent.
18. *a, b.* External right aspect of two pairs from Magheragera, Co. Fermanagh.
19. —— of a pair from Rhosneigr, Anglesey.
20. —— of a pair from Kilcorrig, Lisburn, Co. Antrim.
21. Diagrammatic enlargement of the Hinge.
22. *a-d.* Internal aspect of four valves from the Holocene at Newbury, Berkshire.
23. *a-e.* —— of five valves from the Holocene at Westbury-on-Severn, Gloucestershire.
24. *a-j.* —— of five pairs from Woodburn Dam, Co. Antrim.
25. *a-k.* —— of a series of pairs from Bracebridge, Warwickshire.
26. *a, b.* —— of a pair from Ealing, Middlesex.
27. *a-d.* —— of four valves from the rejectamenta of the Thames at Chertsey Mead, Surrey.
28. *a-g.* —— of a series of valves from the Holocene of the Lea Valley, London.
29. *a-d.* —— of two pairs from the Botanical Gardens at Naples.
30. *a, b.* —— of a pair from Kilcorrig, Lisburn, Co. Antrim.
31. *a-h.* —— of four pairs from Magheragera, Co. Fermanagh.
32. *a-g.* —— of a series of valves from the Pleistocene at Swanscombe, Kent.
33. *a, b.* —— of a pair from Tenby, Pembrokeshire.
34. *a, b.* —— of a pair from the River Po, Italy.
35. *a, b.* —— of an abnormal pair from Walworth Wood, Co. Londonderry.
36. *a, b.* —— of a pair from Willenhall, Staffordshire.
37. *a, b.* —— of two valves from the Cromerian (peat) at West Runton, Norfolk.
38. *a, b.* —— of a pair from Comber, Co. Down.
39. *a, b.* —— of a pair from Walworth Wood, Co. Londonderry.
40. *a, b.* —— of a pair from Sutton Coldfield Park, Warwickshire.
41. *a, b.* —— of two valves from the Pleistocene at West Wittering, Sussex.

\*\*\* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.





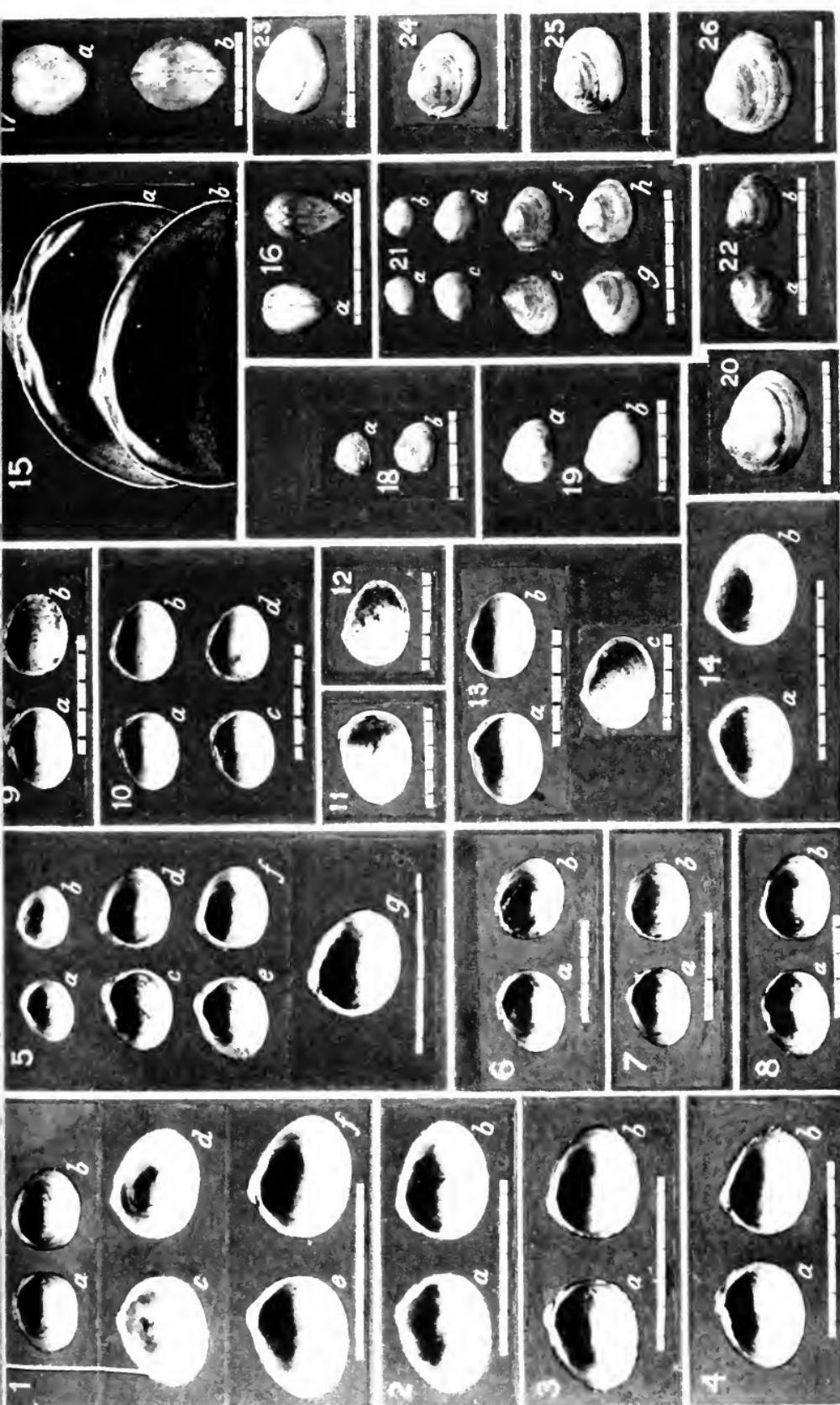


## PLATE XXII.

### *PISIDIUM SUBTRUNCATUM*, Malm.

1. *a-f.* Internal aspect of three pairs showing variation, from the Six-mile-water, Antrim.
2. *a, b.* —— of a pair from the Avon at Salisbury, Wiltshire.
3. *a, b.* —— of a pair from Drum Bridge, Lagan, Co. Antrim.
4. *a, b.* —— of a pair from Catford, Kent.
5. *a-g.* —— of three pairs and a left valve from Ranmore Common, Surrey.
6. *a, b.* —— of a pair from Rhosneigr, Anglesey.
7. *a, b.* —— of a pair from Bracebridge, Warwickshire.
8. *a, b.* —— of a pair from Lochmaben, Dumfriesshire.
9. *a, b.* —— of two valves from the Holocene of the Lea Valley, London.
10. *a, b.* —— of four valves from the Pleistocene at West Wittring, Sussex.
11. —— of a right valve from the Holocene of the Lea Valley, London.
12. —— of a left valve from the Pleistocene at Swanscombe, Kent.
13. *a-c,* —— of three valves from the Holocene at Newbury, Berks.
14. *a, b.* —— of two valves from the rejectamenta of the Thames at Chertsey Mead, Surrey.
15. Diagrammatic enlargement of the Hinge.
16. Posterior and dorsal view of a pair from the Red Bridge Pond, Hampstead Heath, London.
17. —— of a pair from the Six-mile-water, Antrim.
18. *a, b.* External right aspect of two pairs from the Red Bridge Pond, Hampstead Heath, London.
19. *a, b.* } —— of three pairs from Six-mile-water, Antrim.
20. } —— of three pairs from Six-mile-water, Antrim.
21. *a-h.* External aspect of a series of four pairs from Ranmore Common, Surrey.
22. *a, b.* —— of a pair from Bracebridge, Warwickshire.
23. External right aspect of a pair from the Avon at Salisbury, Wiltshire.
24. —— of a pair from Catford, Kent.
25. —— of a pair from Rhosneigr, Anglesey.
26. —— of a pair from Gloucester.

\*.\* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.

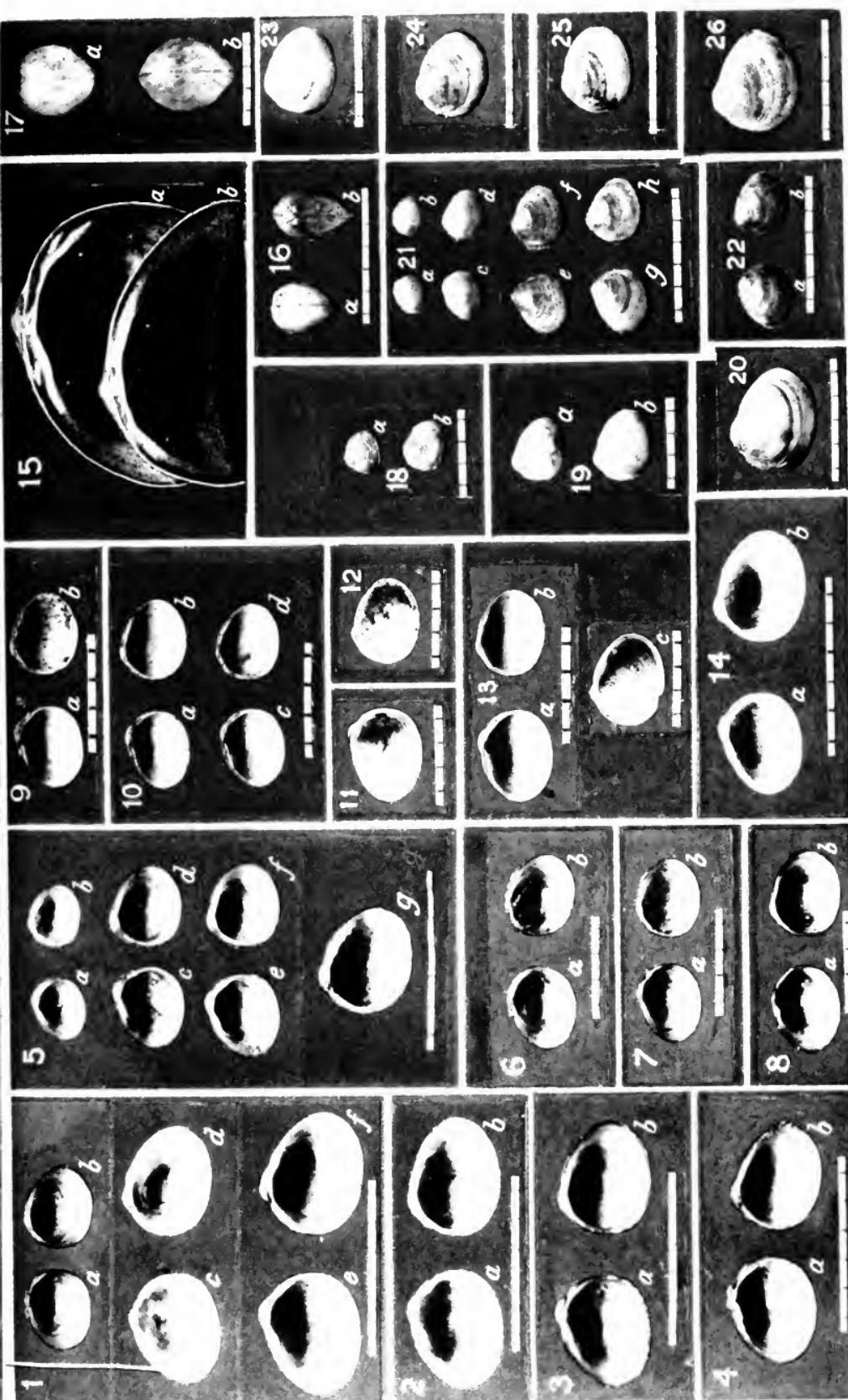


## PLATE XXII.

### *PISIDIUM SUBTRUNCATUM*, Malm.

1. *a-f.* Internal aspect of three pairs showing variation, from the Six-mile-water, Antrim.
2. *a, b.* —— of a pair from the Avon at Salisbury, Wiltshire.
3. *a, b.* —— of a pair from Drum Bridge, Lagan, Co. Antrim.
4. *a, b.* —— of a pair from Catford, Kent.
5. *a-g.* —— of three pairs and a left valve from Ranmore Common, Surrey.
6. *a, b.* —— of a pair from Rhosneigr, Anglesey.
7. *a, b.* —— of a pair from Bracebridge, Warwickshire.
8. *a, b.* —— of a pair from Lochmaben, Dumfriesshire.
9. *a, b.* —— of two valves from the Holocene of the Lea Valley, London.
10. *a, b.* —— of four valves from the Pleistocene at West Wittring, Sussex.
11. —— of a right valve from the Holocene of the Lea Valley, London.
12. —— of a left valve from the Pleistocene at Swanscombe, Kent.
13. *a-c,* —— of three valves from the Holocene at Newbury, Berks.
14. *a, b.* —— of two valves from the rejectamenta of the Thames at Chertsey Mead, Surrey.
15. Diagrammatic enlargement of the Hinge.
16. Posterior and dorsal view of a pair from the Red Bridge Pond, Hampstead Heath, London.
17. —— of a pair from the Six-mile-water, Antrim.
18. *a, b.* External right aspect of two pairs from the Red Bridge Pond, Hampstead Heath, London.
19. *a, b.*
20. } —— of three pairs from Six-mile-water, Antrim.
21. *a-h.* External aspect of a series of four pairs from Ranmore Common, Surrey.
22. *a, b.* —— of a pair from Bracebridge, Warwickshire.
23. External right aspect of a pair from the Avon at Salisbury, Wiltshire.
24. —— of a pair from Catford, Kent.
25. —— of a pair from Rhosneigr, Anglesey.
26. —— of a pair from Gloucester.

\* \* \* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.







### PLATE XXIII.

#### *PISIDIUM PULCHELLUM*, Jenyns.

1. a, b. External right aspect of two pairs from Comber, Co. Down.
3. —— of a pair from Aldenham, Hertfordshire.
4. —— of a pair from Denham, Buckinghamshire.
5. —— of a pair from Harefield, Middlesex.
6. a, b. Posterior and dorsal view of a pair from the same locality.
7. a, b. —— of a pair from Bracebridge, Warwickshire.
8. a, b. —— of a pair from Walworth, Co. Londonderry.
9. a, b. External right aspect of two pairs from the same locality.
10. —— of a valve from the Holocene of the Lea Valley, London.
- 10\*. —— of a valve from the Holocene in Berkshire, near Staines.
11. a-d. —— of a series of pairs from Bracebridge, Warwickshire.
12. a-g. Internal aspect of another series from the same locality.
13. Diagrammatic enlargement of the Hinge,
- 13\*. External right aspect of a valve from the Pleistocene at West Wittering, Sussex.
14. a-f. Internal aspect of a series of valves from the Holocene of the Lea Valley, London.
15. a, b. —— of a pair from Comber, Co. Down.
16. a, b. —— of a pair from Walworth, Co. Londonderry.
17. a, b. —— of two valves from the Holocene in Surrey, near Staines.
19. a, b. —— of a pair from the Coln, West Drayton, Middlesex.
20. a, b. —— of a pair from Denham, Buckinghamshire.

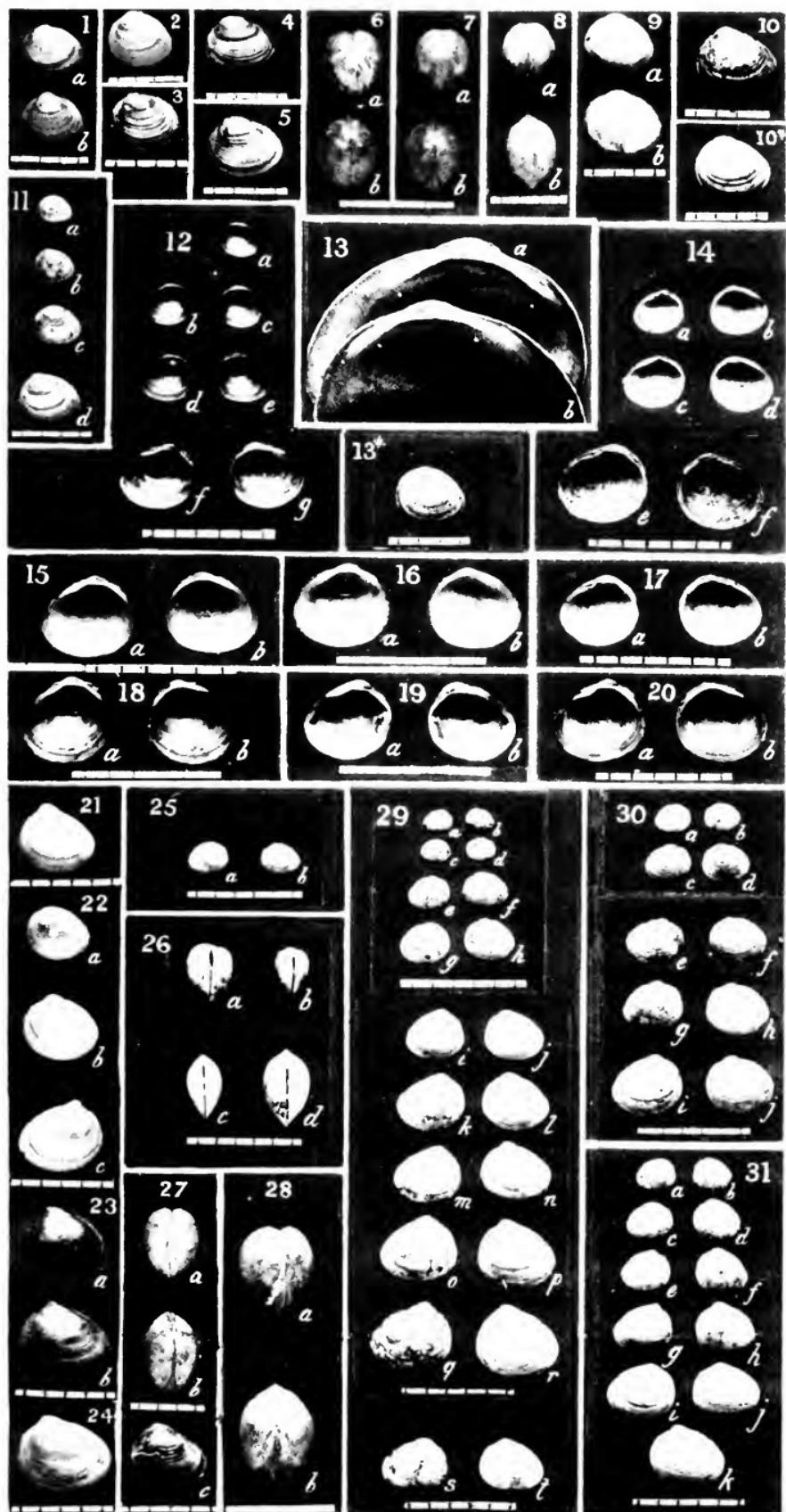
#### *PISIDIUM LILLJEBORGII*, Clessin.

2. External right aspect of a pair from Silverdale, Lancashire.
18. a, b. Internal aspect of another pair from the same locality.  
[These figures are placed here for comparison with those of the foregoing species for which *P. lilljeborgii* has sometimes been mista-

#### *PISIDIUM HENSLOWANUM*, Sheppard.

21. External right aspect of a pair from the Avon at Salisbury, Wiltshire.
22. a-c. External aspect of three pairs from the Wendover Canal, Buckinghamshire.
23. a, b. External right aspect of two pairs from Sutton Coldfield, Warwickshire.
24. —— of a pair from Berkhamstead, Hertfordshire.
28. a, b. External aspect of two very young valves from the Holocene at Ipswich, Suffolk, to show the position at this age of the appendiculae. (*Cf.* also 29 c & d.)
26. a, d. } Posterior and dorsal views of apposed valves from the Pleistocene at Crayford-Erith, Kent.  
b, c. }
27. a, b. —— of a pair from the Red Bridge Pond, Hampstead Heath, London.
27. c. External right aspect of another pair from the same locality.
28. a, b. Posterior and dorsal view of a pair from Baguley, Cheshire.
29. a-t. External aspect of a series of valves of all ages showing variation, from the Pleistocene at Crayford-Erith, Kent.  
[s & t are examples of the fractured and repaired valves which are not uncommon in the deposit.]
30. a-j. —— of a series from the Pleistocene at Swanscombe, Kent.
31. a-k. —— of a similar series from the Pleistocene at Clacton, Essex.

\*.\* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.







## PLATE XXIV.

### *PISIDIUM HENSLOWANUM*, Sheppard.

1. *a-f.* Internal aspect of a series of valves from the Holocene at Blythburgh, Suffolk.
2. *a-k,* —— of a series of valves of different ages to show variation, from the rejectamenta of the Thames at Chertsey Mead, Surrey.
3. *a, b.* —— of a pair from the Wendover Canal, Buckinghamshire.
4. Diagrammatic enlargement of the Hinge.
- 5, *a, b.* Internal aspect of a large pair from Lyngby-Bagsvör Sö, Sealand.
6. *a, b.* —— of a pair from Sutton Coldfield, Warwickshire.
7. *a, b.* —— of a pair from the Red Bridge Pond, Hampstead Heath, London.
8. *a-h.* } —— of a series of valves of all ages showing variation,
9. *a-i.* } —— from the Pleistocene at Crayford-Erith, Kent.
10. *a, b.* —— of two valves from the Cromerian (peat) at West Runton, Norfolk.
11. *a-j.* —— of a series of valves of different ages showing variation, from the Pleistocene at Clacton, Essex
12. *a-j.* —— —— from the Pleistocene at Swanscombe, Kent.

\* \* \* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.

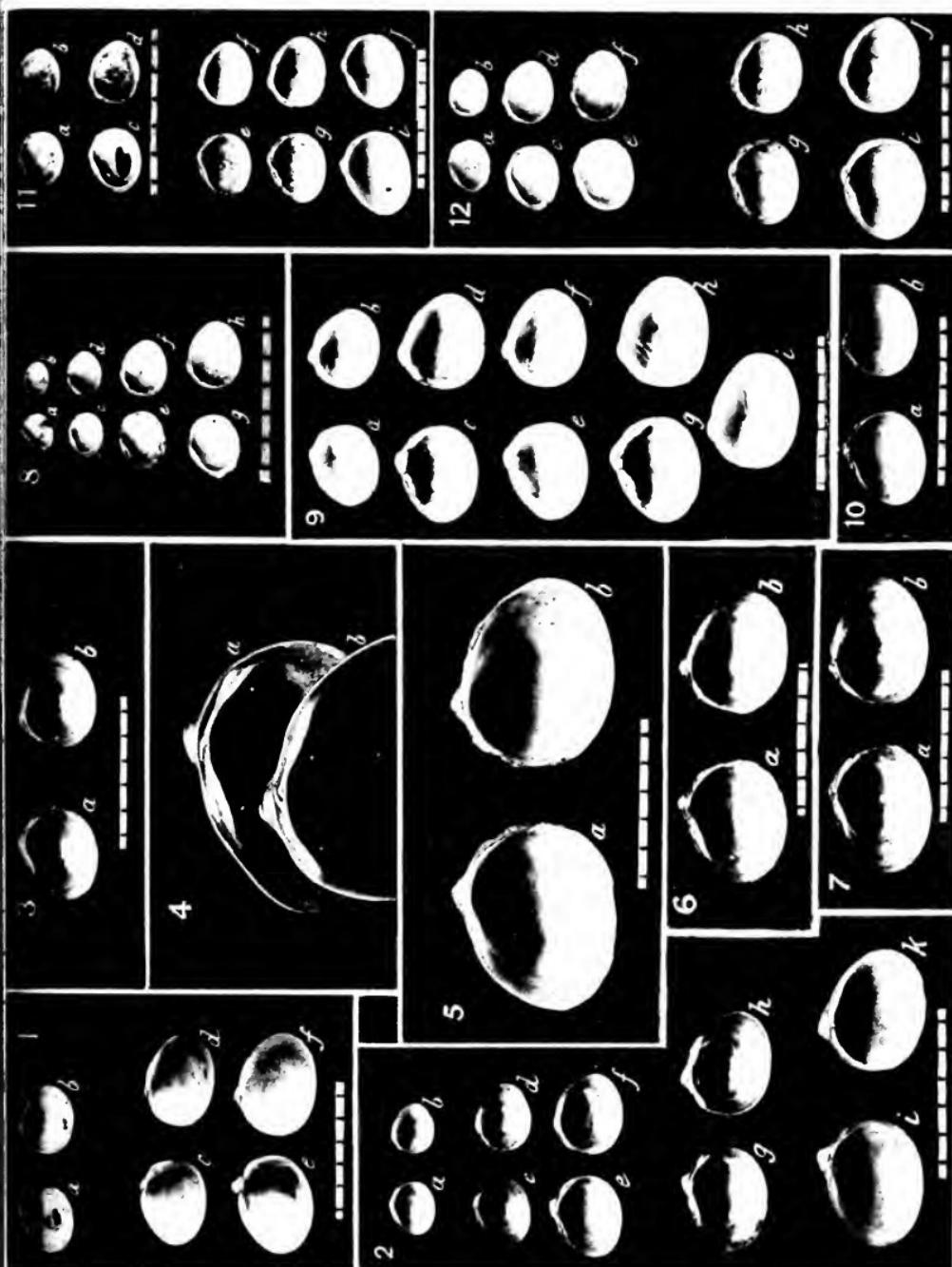






PLATE XXV.

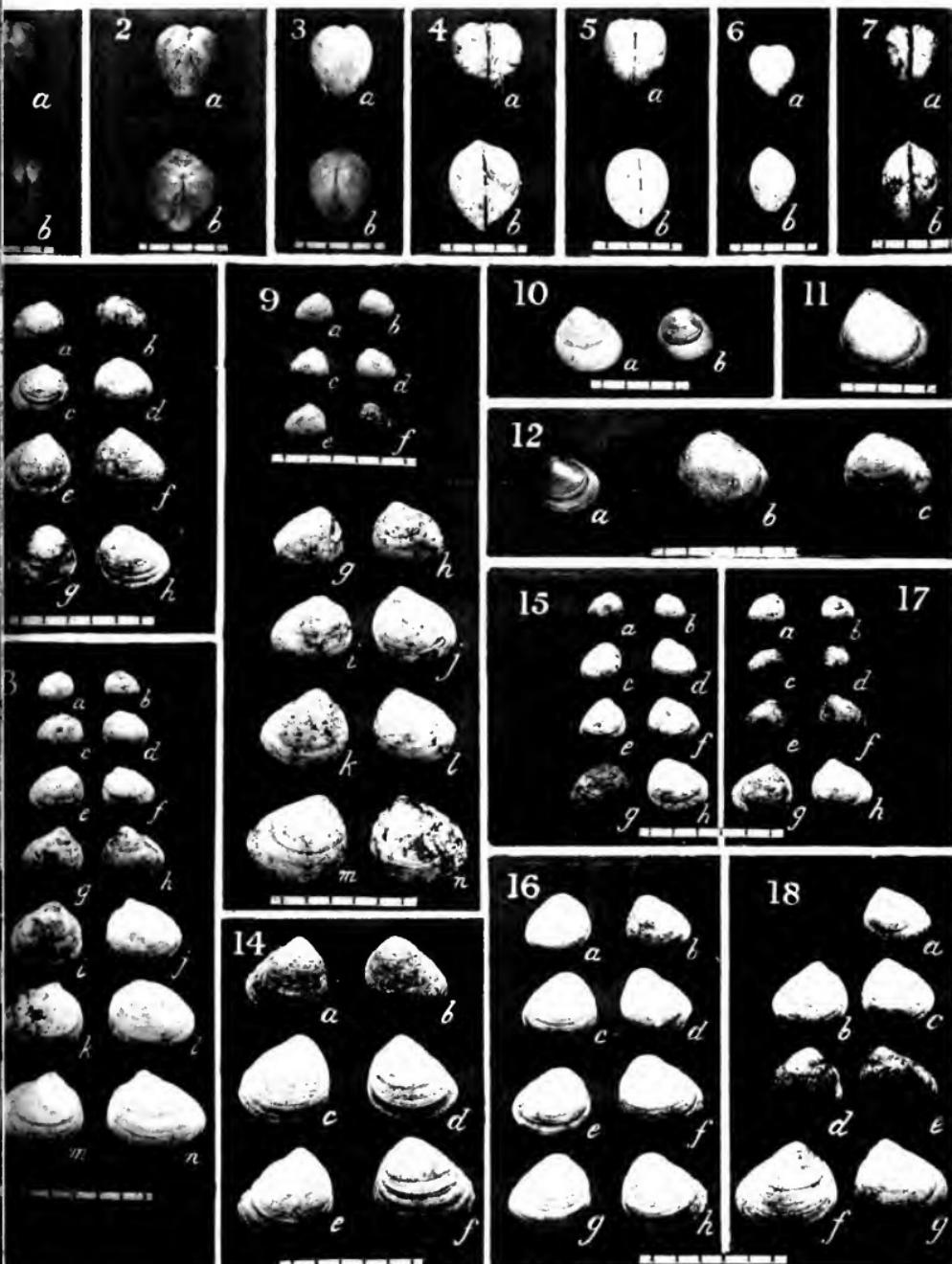
*PISIDIUM SUPINUM*, A. Schmidt.

1. *a, b.*} Posterior and dorsal view of two pairs from the Thames
2. *a, b.*} — at Twickenham, Middlesex.
3. *a, b.* — of a pair from Rickmansworth, Hertfordshire.
4. *a, b.*} — of apposed valves from the Pleistocene at Grays,
5. *a, b.*} — Essex.
6. *a, b.* — of a pair from the same formation and locality.
7. *a, b.* — of apposed valves from the Pleistocene at Crayford-Erith, Kent.
8. *a-h.* External aspect of a series of all ages showing variation, from the Pleistocene at Clacton, Essex.
9. *a-n.* — — — from the Pleistocene at Crayford-Erith, Kent.
10. *a, b.* External right aspect of two pairs from Marsworth, Buckinghamshire.
11. — of a very triangular pair from Rickmansworth, Hertfordshire.
12. *a-c.* — of three pairs of different ages from the Thames at Twickenham, Middlesex.
14. *a-f.* External aspect of a series of valves of the triangular form from the Cromerian (gravel) at West Runton, Norfolk.
15. *a-h.*} External aspect of a series showing variation, of the rounded-triangular form from the Pleistocene at
16. *a-k.*} — Grays, Essex.
17. *a-h.*} — of the elongate-triangular form from the same
18. *a-g.*} — deposits.

*PISIDIUM HENSLOWANUM*, Sheppard.

13. *a-n.* External aspect of a series of valves of all ages from the Pleistocene at Grays, Essex, for comparison with the closely similar form of *P. supinum* shown at 17 & 18.

\* \* \* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.



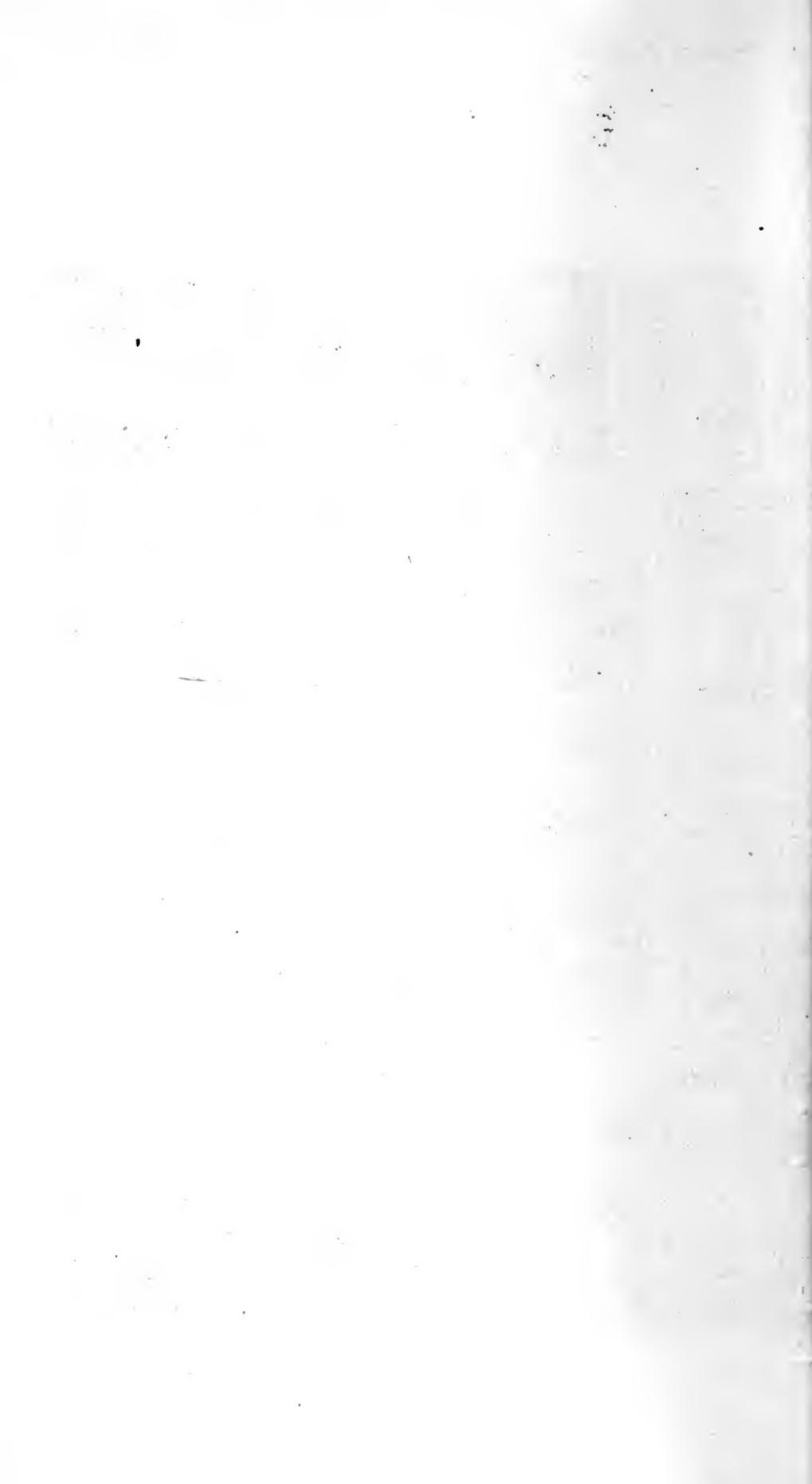




PLATE XXVI.

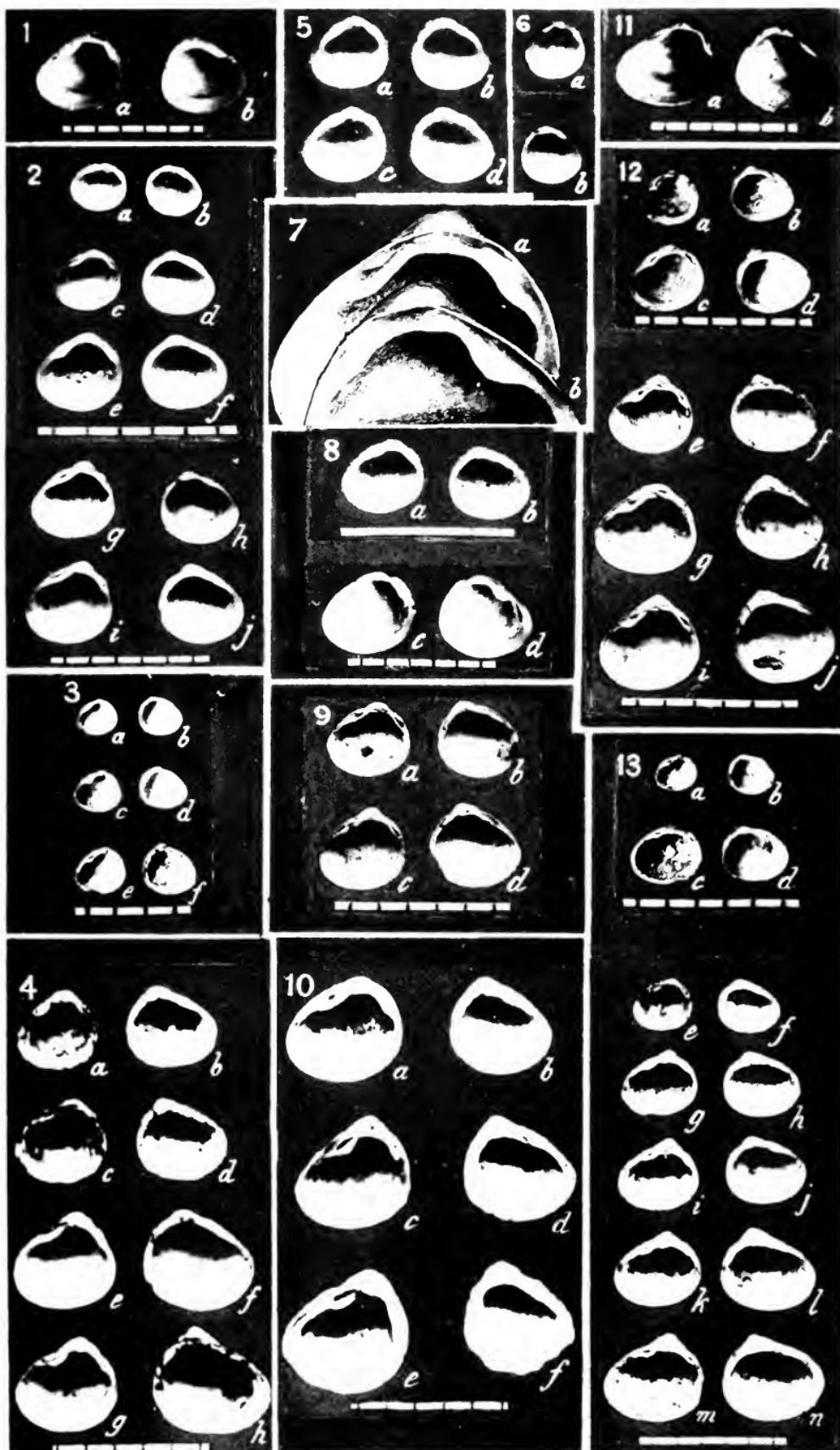
*PISIDIUM SUPINUM*, A. Schmidt.

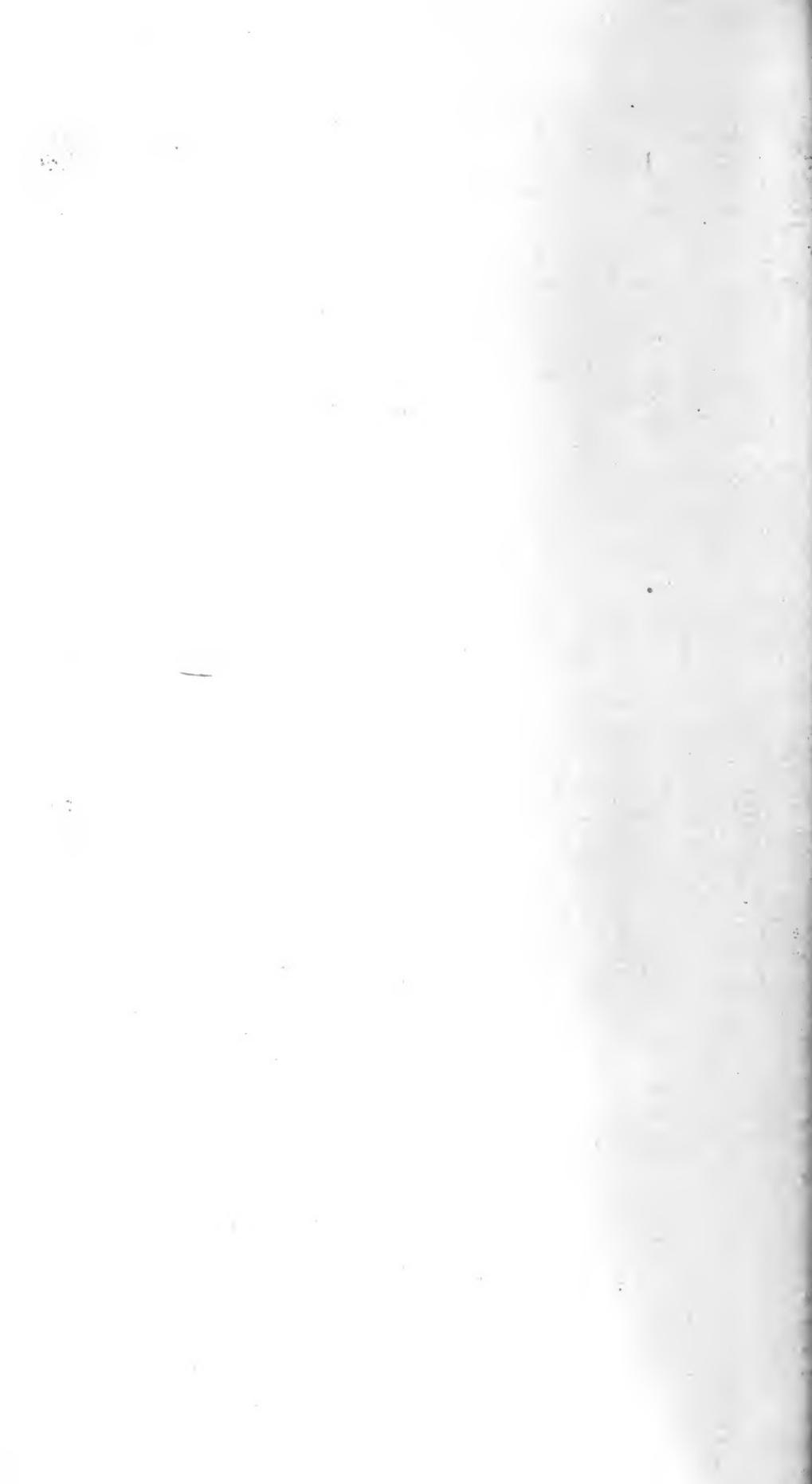
1. *a, b.* Internal aspect of a very triangular pair from Rickmansworth, Hertfordshire.
2. *a-j.* —— of a series of valves of all ages showing variation, from the rejectamenta of the Thames at Chertsey Mead, Surrey.
3. *a-f.* } —— —— from the Pleistocene at Crayford-Erith,  
4. *a-h.* } Kent.
5. *a-d.* —— of two pairs from Marsworth, Buckinghamshire.
6. *a, b.* —— of a pair from the Thames at Hampton Wick, Middlesex.
7. Diagrammatic enlargement of the Hinge.
8. *a-d.* Internal aspect of two pairs from the Thames at Twickenham, Middlesex.
9. *a-d.* —— of four valves from the Cromerian (peat) at West Runton, Norfolk.
10. *a-f.* —— of six valves from the Cromerian (gravel) at the same locality.
11. *a-b.* —— of a pair from Budworth Mere, Cheshire.
12. *a-j.* —— of a series of valves showing variation, from the Pleistocene at Clacton, Essex.

*PISIDIUM HENSLOWANUM*, Sheppard.

13. *a-n.* Internal aspect of a series of the thickened form from the Pleistocene at Grays, Essex, for comparison with the similar series of *P. supinum* shown at 4 and on Pl. XXVII, 1 & 2.

\* \* \* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.





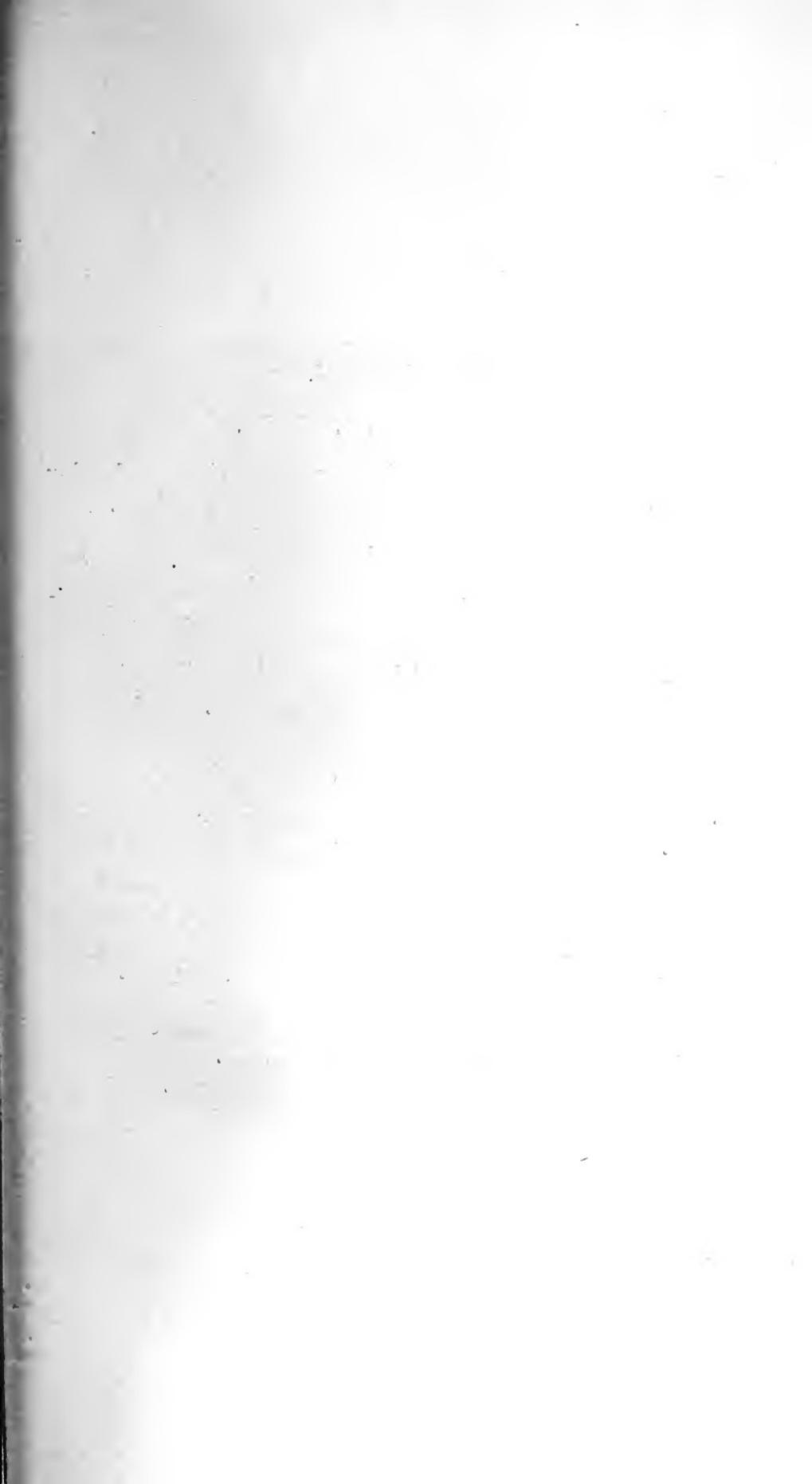


PLATE XXVII.

### PISIDIUM SUPINUM, A. Schmidt.

1. *a-q.*} Internal aspect of a series of valves of all ages showing  
2. *a-x.*} variation, from the Pleistocene at Grays, Essex.

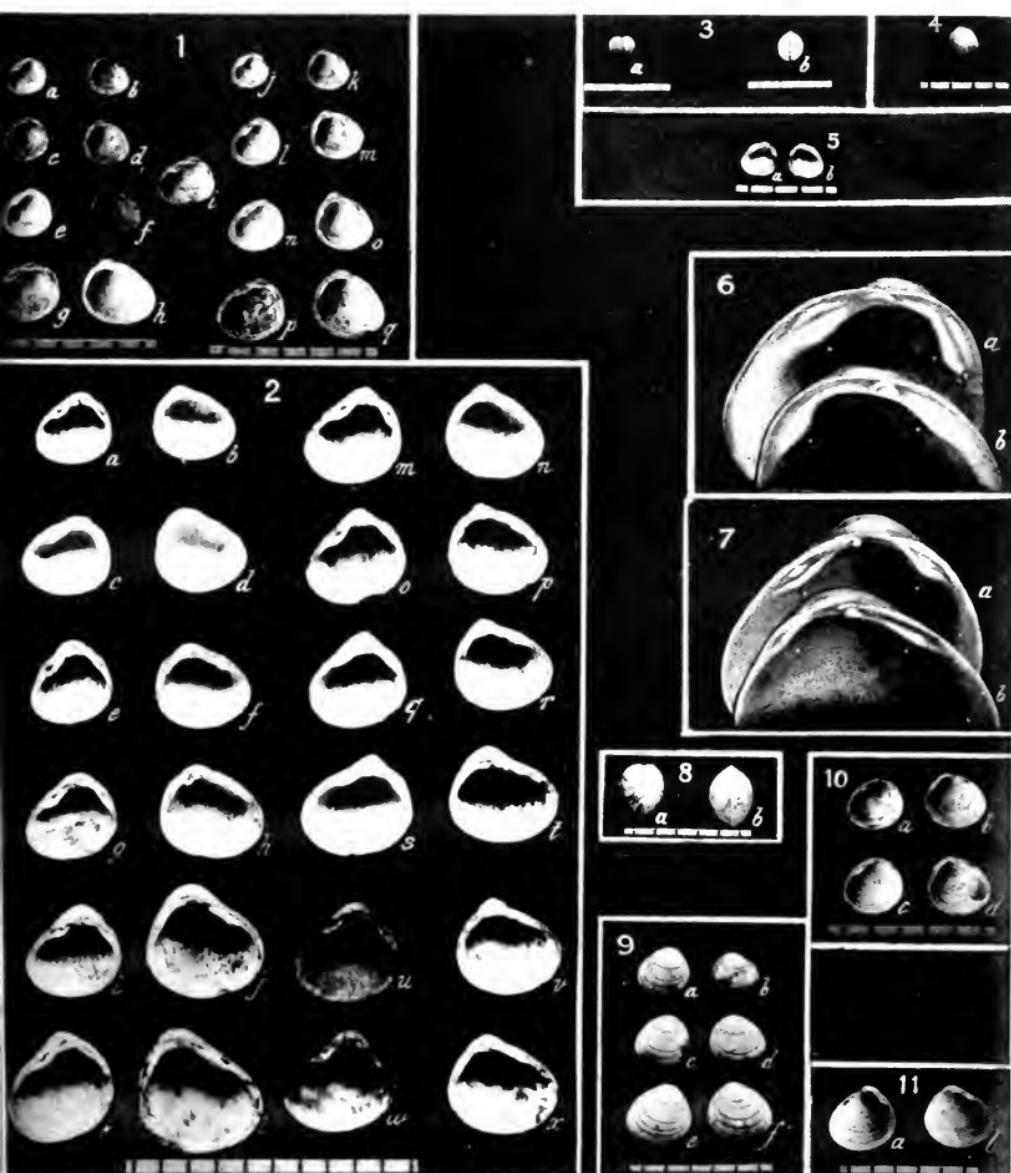
**PJSIDIUM PARVULUM**, Clessin.



**PISIDIUM VINCENTIANUM**, B. B. Woodward, n. sp.

7. Diagrammatic enlargement of the Hinge.  
 8. *a-b.* Posterior and dorsal aspect of apposed valves } from the  
 9. *a-f.* External aspect of a series of valves } Campinien  
 10. *a-d.* Internal aspect of a series of valves } (Pleistocene)  
 11. *a, b.* } at Soignies,  
 } Belgium.

\*\*\* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.







## PLATE XXVIII.

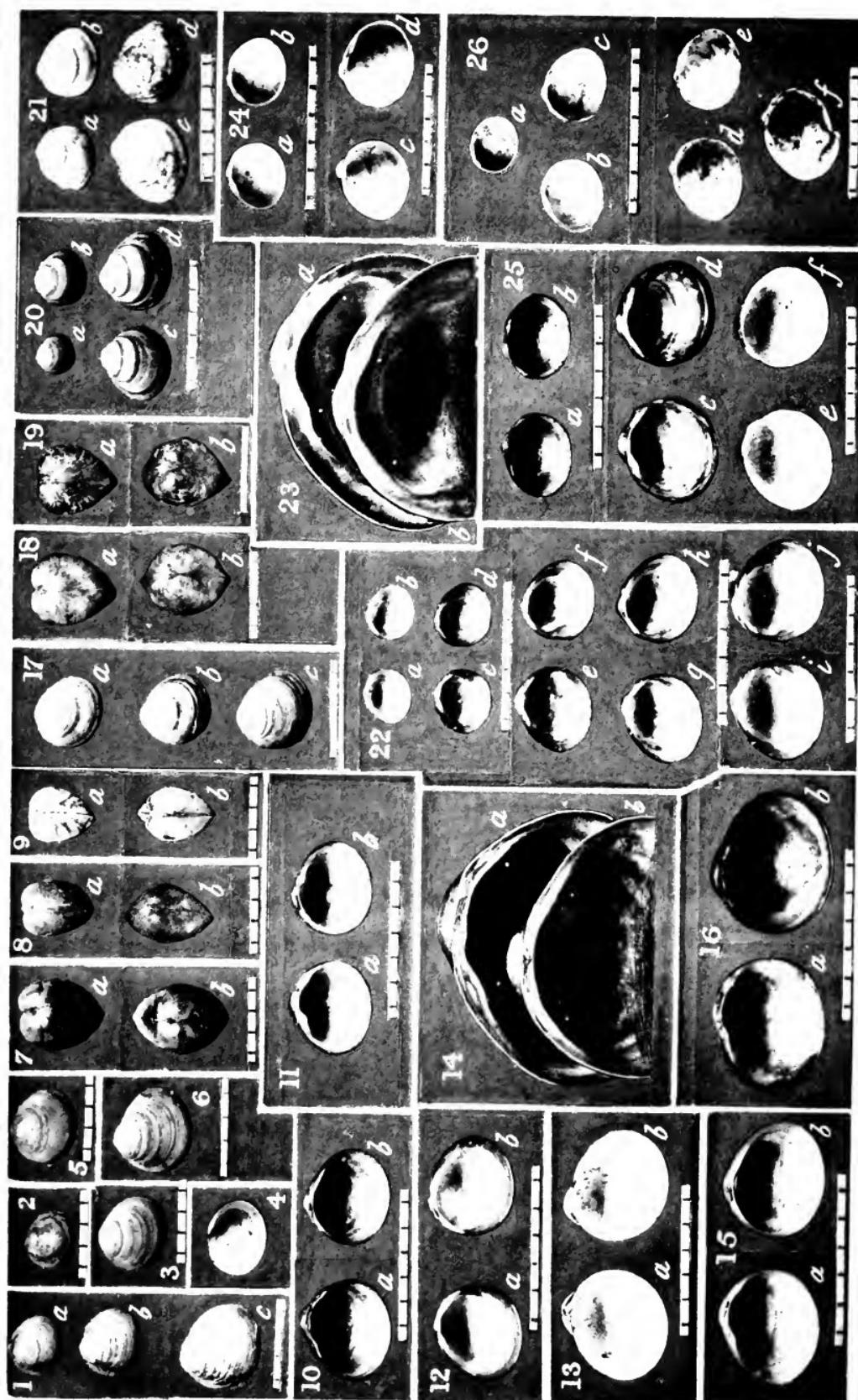
### PISIDIUM STEENBUCHII (Möller).

2. External right aspect of a pair from Abbey Holme, Cumberland.
3. —— of a pair from Bjerking, Målselvdalen, Norway. ("*P. globulare*, Clessin.")
4. Internal aspect of a left valve from Abbey Holme, Cumberland.
5. External right aspect of a pair from Grisel Bottom, Burwell Wood, Lincolnshire.
6. —— of a pair from West Greenland.
7. a, b. Posterior and dorsal view of a pair from the same locality.
8. a, b. —— of a pair from Grisel Bottom, Burwell Wood, Lincolnshire.
10. a, b. Internal aspect of a pair from West Greenland.
11. a, b. —— of a pair from Grisel Bottom, Burwell Wood, Lincolnshire.
14. Diagrammatic enlargement of the Hinge.
15. a, b. Internal aspect of a pair from Bjerking, Målselvdalen, Norway. ("*P. globulare*, Clessin.")
16. a, b. —— of a pair from Finmarken, Norway. ("*P. globulare*, Clessin.")

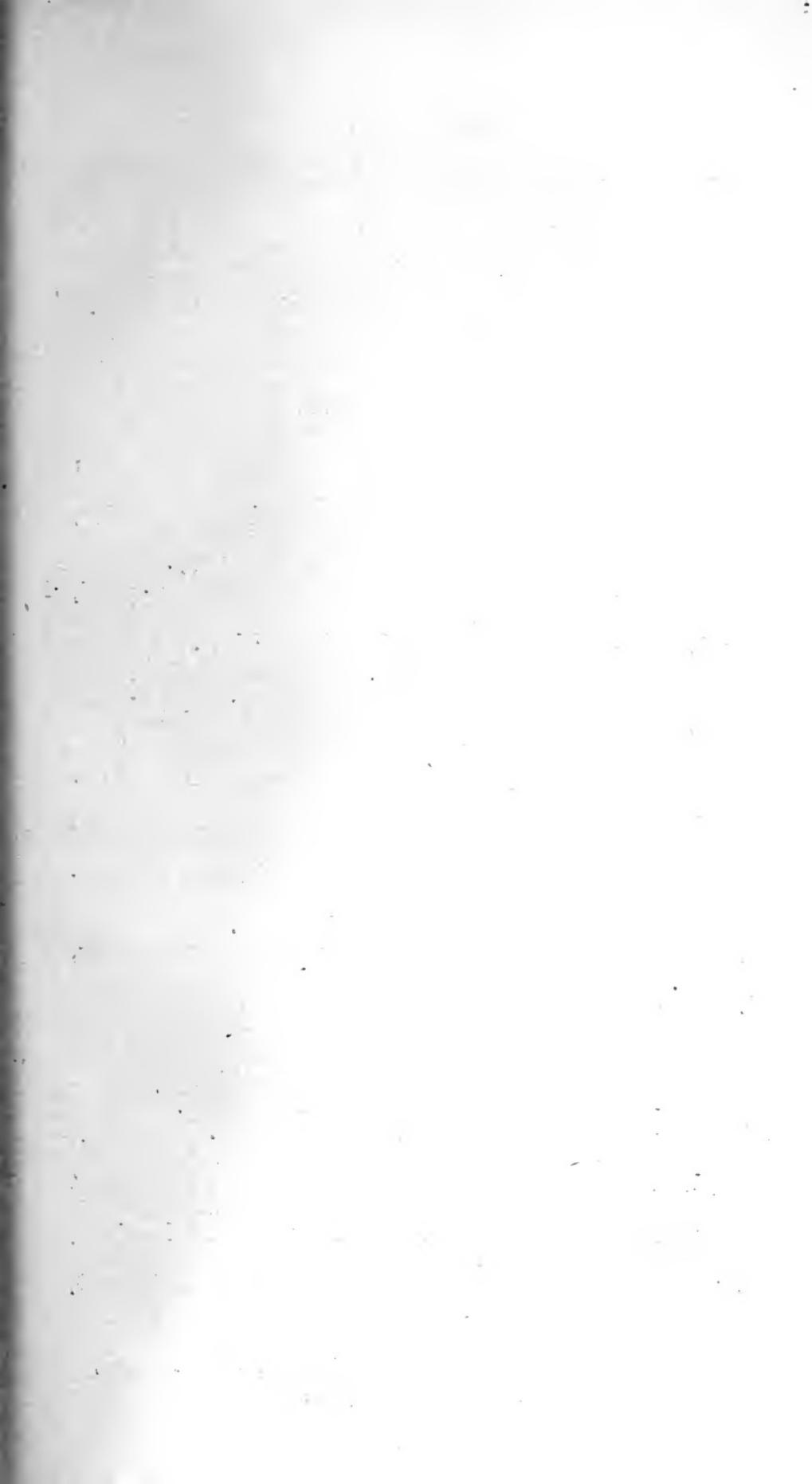
### PISIDIUM LILLJEBORGII, Clessin.

1. a-c. External right aspect of three pairs from Lochan a' Chait, Perthshire.
9. a, b. Posterior and dorsal view of a pair from the same locality.
12. a, b. } Internal aspect of two pairs from the same locality.
13. a, b. }
17. a-c. External right aspect of three pairs from Sönset, Norway. (Clessin.)
18. a, b. Posterior and dorsal view of a pair from Lough Aguse, Co. Fermanagh.
19. a, b. —— of a pair from Sönset, Norway. (Clessin.)
20. a-d. External aspect of four valves from the Holocene at Gayfield, Edinburgh.
21. a-d. —— of four valves from the Pleistocene at Crayford-Erith, Kent.
22. a-j. Internal aspect of five pairs showing variation, from Sönset, Norway. (Clessin.)
23. Diagrammatic enlargement of the Hinge.
24. a-d. Internal aspect of four valves from the Holocene at Gayfield, Edinburgh.
25. a-f. —— of three pairs from Lough Aguse, Co. Fermanagh.
26. a-f. —— of six valves from the Pleistocene at Crayford-Erith, Kent.

\* \* \* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.







## PLATE XXIX.

### *PISIDIUM HIBERNICUM*, Westerlund.

- |                          |                                       |   |   |
|--------------------------|---------------------------------------|---|---|
| 1.                       | External right aspect of a pair       | } | from<br>Lough<br>Namaddrá,<br>Co. Cork. |
| 2. <i>a</i> , <i>b</i> . | Internal aspect of two pairs          |   |   |
| 3. <i>a</i> , <i>b</i> . | Diagrammatic enlargement of the Hinge |   |   |
| 4.                       | Anterior and dorsal view of a pair    |   |   |
| 5. <i>a</i> , <i>b</i> . | External right aspect of a pair       |   |   |
| 6.                       |                                       |   |   |

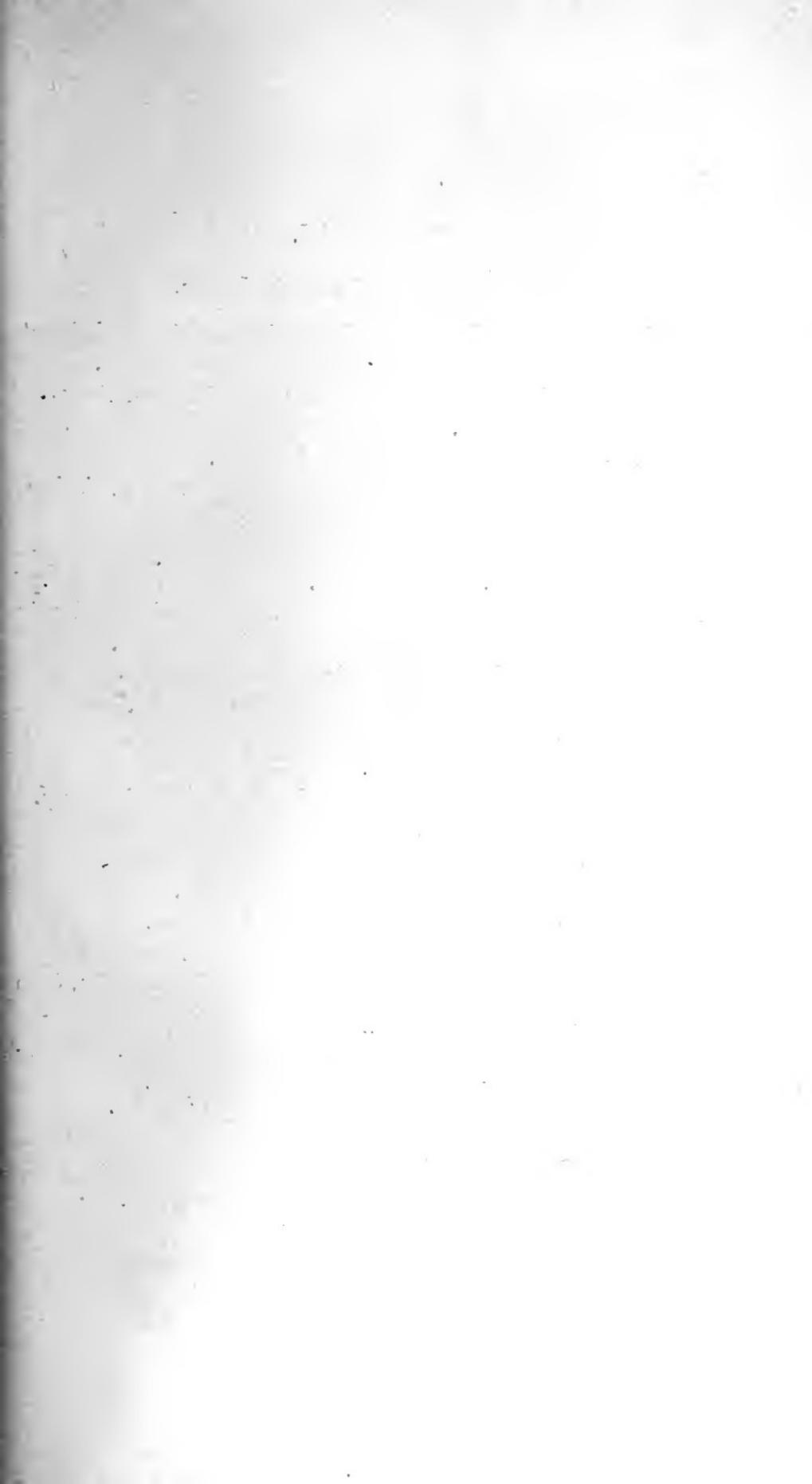
### *PISIDIUM MILIUM*, Held.

7. *a-j*. Internal aspect of five pairs of different ages, from Totteridge, Hertfordshire.
8. *a*, *b*. Posterior and dorsal view of a pair from Comber, Co. Down.
9. *a*, *b*. —— of a pair from Criccieth, Carnarvonshire.
10. *a*, *b*. —— of apposed valves from the Holocene at Gayfield, Edinburgh,
11. *a*, *b*. —— of a pair from Ashridge, Hertfordshire.
12. *a*, *b*. Internal aspect of a pair from Blythburgh, Suffolk.
13. *a*, *b*. —— of a pair from Rhosneigr, Anglesey.
14. *a*, *b*. —— of a pair from Sutton Coldfield, Warwickshire.
15. *a*, *b*. —— of a pair from Lochmaben, Dumfriesshire.
16. *a*, *b*. —— of a pair of valves from the Holocene at Newbury, Berkshire.
17. *a*, *b*. —— of a pair of valves from the Holocene at Shand Street, Tooley Street, London.
18. *a*, *b*. —— of a pair of valves from the Pleistocene at Swanscombe, Kent.
19. Diagrammatic enlargement of the Hinge.
20. *a-e*. External right aspect of five pairs of different ages, from Totteridge, Hertfordshire.
21. —— of a pair from Blythburgh, Suffolk.
22. —— of a pair from Rhosneigr, Anglesey.
23. —— of a pair from Comber, Co. Down.
24. —— of a pair from Ashridge, Hertfordshire.
25. —— of a pair from Criccieth, Carnarvonshire.
26. —— of a pair from Castle Rising, Norfolk.
27. —— of a pair from Baguley Pit, Cheshire.
28. *a*, *b*. External aspect of two valves from the Holocene at Shand Street, Tooley Street, London.
29. *a*, *b*. —— of two valves from the Holocene at Newbury, Berkshire.
30. *a-f* —— of six valves from the Holocene at Gayfield, Edinburgh.

\*.\* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.





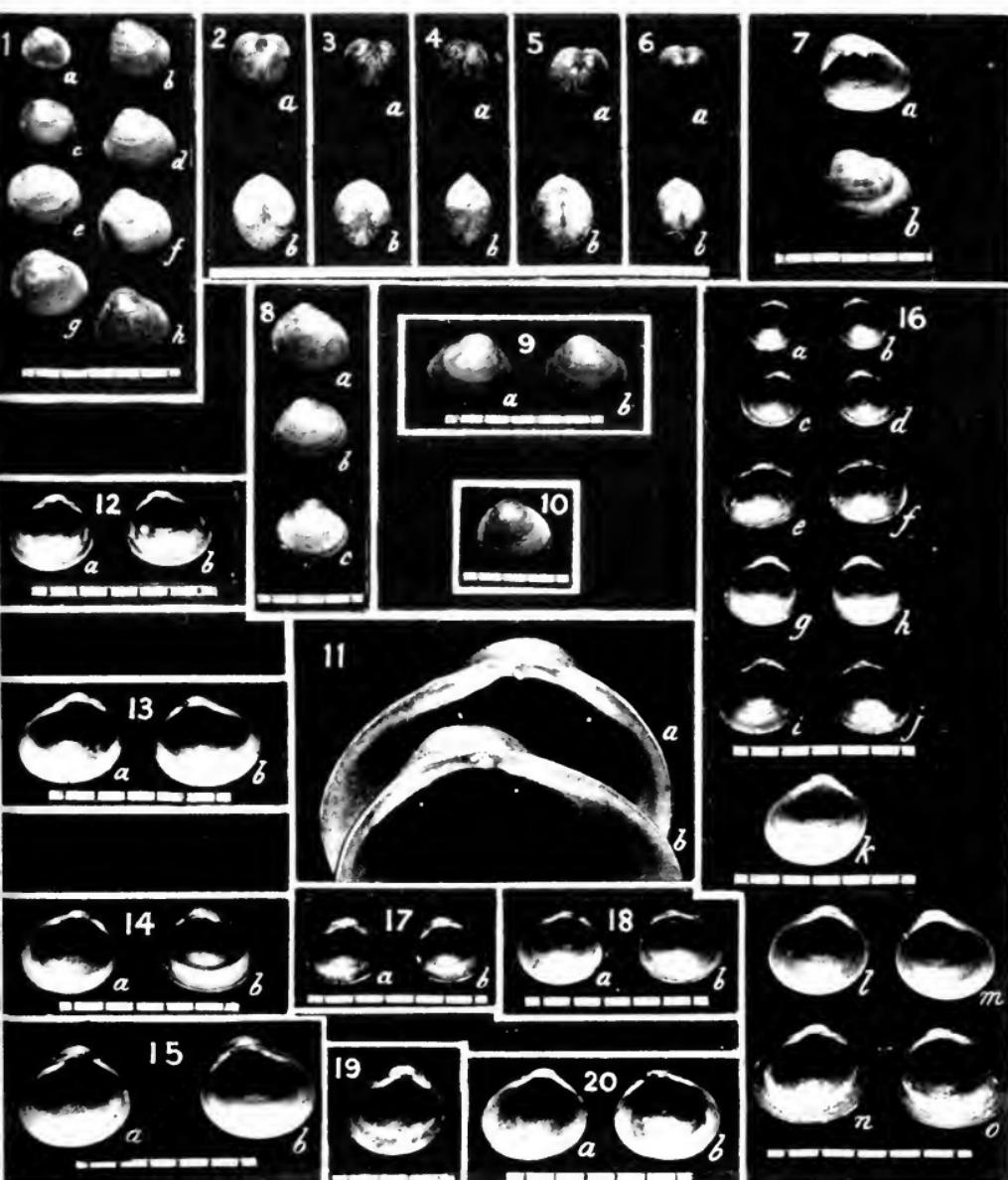


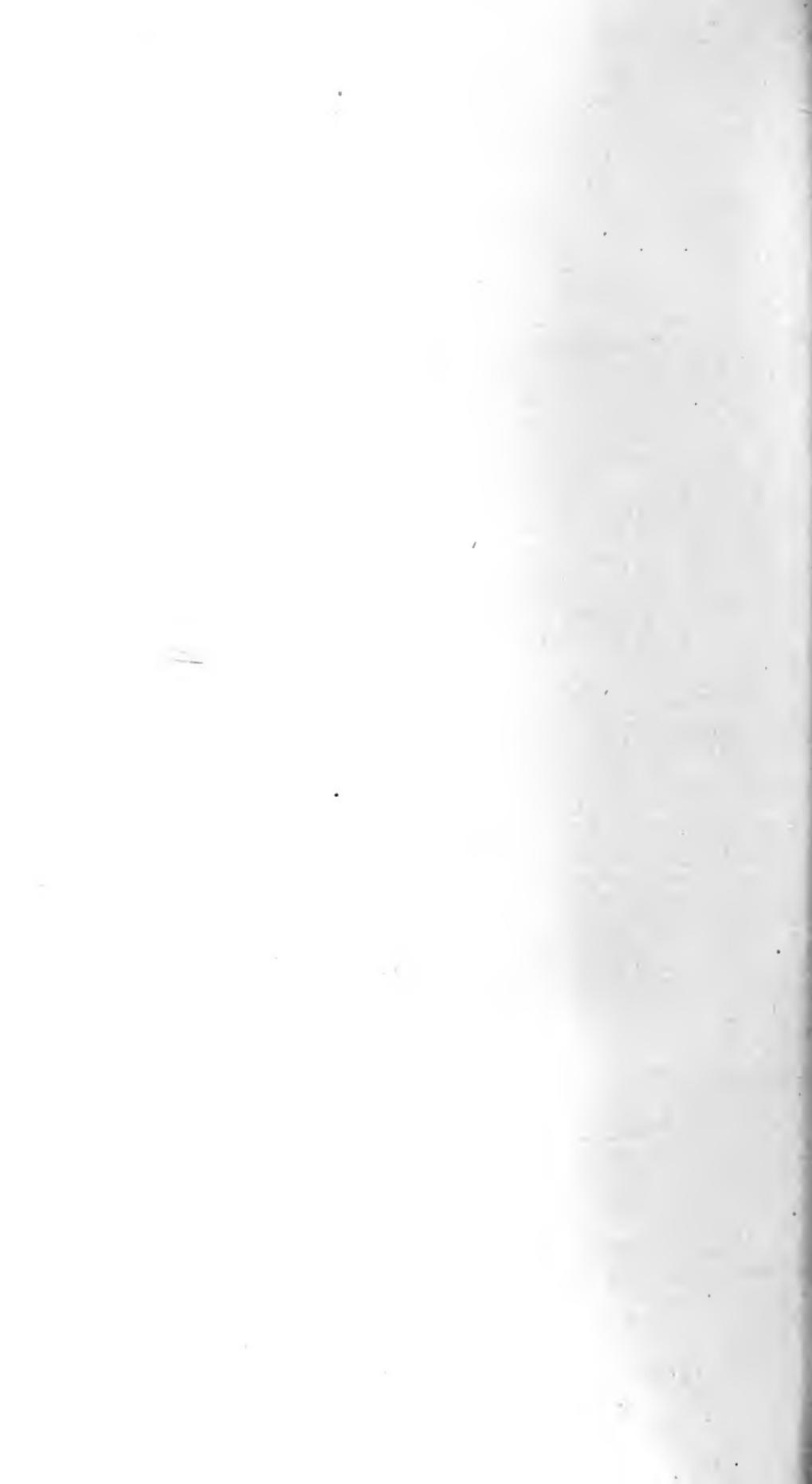
## PLATE XXX.

### PISIDIUM OBTUSALE, (Lamarck) Jenyns.

1. *a-h.* External right aspect of a series of pairs of different ages showing variation, from Birch, Essex.
2. *a, b.* } Posterior and dorsal view of two pairs from the same
3. *a, b.* } locality.
4. *a, b.* —— of a pair from Guildford, Surrey.
5. *a, b.* —— of a pair from Swinton, Lancashire. ("*P. nitidum*, var. *globosa*, Jeffr.": T. Rogers coll.)
6. *a, b.* —— of a pair from Övergåde, Målselvdalen, Norway. ("*P. scholtzi*, Clessin.")
7. *a, b.* Exterior and interior right view of an abnormal pair from Walworth Wood, Co. Londonderry.
8. *a-c.* External right aspect of three pairs showing variation in form, from Lochmaben, Dumfriesshire.
9. *a, b.* —— right and left aspect of a pair from Llandaff, Glamorganshire.
10. External right aspect of a pair from Guildford, Surrey.
11. Diagrammatic enlargement of the Hinge.
12. *a, b.* Internal aspect of a pair from Guildford, Surrey.
13. *a, b.* —— of a pair from Llandaff, Glamorgan.
14. *a, b.* —— of a pair from Reydon Marsh, Suffolk.
15. *a, b.* —— of a pair from Lytham, Lancashire.
16. *a-o.* —— of a series of different ages showing variation, from Birch, Essex.
17. *a, b.* —— of a pair from Övergåde, Målselvdalen, Norway. ("*P. scholtzi*, Clessin.")
18. *a, b.* —— of a pair from Lochmaben, Dumfriesshire.
19. —— of a right valve from Swinton, Lancashire. ("*P. nitidum*, var. *globosa*, Jeffr.": T. Rogers coll.)
20. *a, b.* —— of a pair from Criccieth, Carnarvonshire.

\* \* \* The scale in millimetres under each figure, or series of figures, shows the amount of magnification.





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